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Skeptical Inquirer

THE MAGAZINE FOR SCIENCE AND REASON

Vol. 44 No. 1 | January/February 2020

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The Skeptical Inquirer (ISSN 0194-6730) is published bi-monthly by the Center for Inquiry in association with the Committee for Skeptical Inquiry, P.O. Box 703, Amherst, NY 14226. Printed in U.S.A. Periodicals postage paid at Buffalo, NY, and at addition al mailing offices. Subscription prices: one year (six issues), $35; two years, $60; three years, $84; single issue, $5.99. Canadian and foreign orders: Payment in U.S. funds drawn on a U.S. bank must accompany orders; please add US$10 per year for shipping. Canadian and foreign customers are encouraged to use Visa or Master Card.

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Subscriptions and changes of address should be addressed to: SKEPTICAL INQUIRER, P.O. Box 703, Amherst, NY 14226-0703 or call toll-free 1-800-634-1610 (outside the U.S. call 716-636-1425). Old address as well as new are necessary for change of address, with ten weeks advance notice. Skeptical Inquirer subscribers may not speak on behalf of CSI or the Skeptical Inquirer.

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"... promotes scientific inquiry, critical investigation, and the use of reason in examining controversial and extraordinary claims."

[FROM THE EDITOR

The Magnificent Quest

Perhaps it's the season. Perhaps it's the start of a new year, a new decade. Whatever the reason, I find myself full of gratitude.

It sometimes may seem as if everyone has gone bonkers and that fake news, factless assertions, disinformation, and misinformation have taken over our public discourse. It's hard to disagree. We suffer from far too much systematic disregard of facts and evidence. But what I am thankful for is that there are still huge legions of science-minded people out there who strongly resist that trend: They do good science and scholarship themselves, or they support it. They may be motivated by the curiosity that drives all science. But they know how essential are good information and skeptical, evidence-based critical thinking to our democratic processes. They crave a return to a time when reason and rationality were respected as a tool to decision-making in the public sphere.

You—our readers, subscribers, and supporters—are primary among them. You seek the scientific perspective on claims and assertions boldly advanced. You treasure skeptical inquiry. You appreciate the nuances in all honest appraisals of competing evidence. You value the efforts we all make to sift out the sense from the nonsense and present it all to you in a clear way to help us all make better judgments. I am so grateful to all of you.

I am also grateful to our authors and contributors. And to skeptics and scientific thinkers everywhere. You research, report, investigate, test, analyze, critique, explain, and educate. This is not easy, and it comes with few rewards. Our authors do whatever is necessary to ascertain the facts and to help us all understand the realities and complexities of nature and human behavior. It is a magnificent quest. It is a crucially important quest. I am so grateful to everyone who participates in it and shares the results with us. Thank you.

* * *

The authors in this issue epitomize what I say above. I have space to mention only two. Jeanne Goldberg, a retired radiologist and writer, previously wrote on our unfounded fears of radiation and the politicization of scientific issues. She returns to our pages here with a mostly sympathetic examination of millennials and post-millennials (Generation Z), considering how they might approach all the issues we are concerned about. Millennials are well-educated (women especially so) digital natives, who have been strongly affected by both the Great Recession and the forces of globalization and technology. They tend not to be joiners. They tend not to be religious. They are concerned about the environment. They generally like science. How will this all play out for our future? That's the big question, but Goldberg sees much reason for hope.

Unfounded fad psychotherapies for young people abound. Many of them are ineffective or even untested; some are harmful. Psychology professor Stephen Hupp has published a book about these pseudosciences, and in this issue he begins a three-part series in which he shares the skeptical insights into them he and his fellow contributors have amassed. I am grateful to him for bringing into our pages all these scholars and investigators—many familiar to Skeptical Inquirer readers, some new to us—with a series of short takes on everything from craniosacral therapy to brain balancing. Just another part of our quest.

—Kendrick Frazier

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It's the Carl Sagan & Ann Druyan Theater: A Gala Event in Los Angeles

Kendrick Frazier

Leading lights in the worlds of science, skepticism, and the arts celebrated the grand opening of the Center for Inquiry (CFI) West and the inauguration of its new theater, named for Carl Sagan and Ann Druyan, in a standing-room-only event the evening of October 21, 2019. The theater at CFI West's new building in Los Angeles was officially unveiled as the Carl Sagan & Ann Druyan Theater.

Druyan spoke movingly about science, reason, truth, her late husband and collaborator, Carl, and "this great honor" bestowed by CFI on the two of them.

The newly remodeled building is at 2535 W. Temple Street, a few miles northwest of downtown Los Angeles just off the Hollywood Freeway (U.S. 101).

Jim Underdown, executive director of CFI West, hosted the ceremonies. CFI CEO and President Robyn Blumner and CFI Board Chair Eddie Tabash also spoke, and the center's bookstore was formally unveiled as the Eddie Tabash Bookstore. Richard Dawkins and several other CFI board members attended, as did actor John de Lancie of *Star Trek: The Next Generation* fame and comedian Matt Walsh of *Veep*.

Sagan and Druyan have long had close connections to CFI, its Committee for Skeptical Inquiry (dating back to when it was CSICOP), and the Skeptical Inquirer. Both were elected fellows of CSI. Druyan was Sagan's collaborator on the epic thirteen-part 1980 PBS television series *Cosmos* as well as on their 1997 movie *Contact*, based on his 1985 novel, and coauthor with him of *Comet* (1985) and *Shadows of Forgotten Ancestors* (1992). She created the reborn *Cosmos* series with the 2014 season *Cosmos: A Spacetime Odyssey* (which won twelve Emmy nominations and three Emmys) and is writer, director, and executive producer of the forthcoming *Cosmos: Possible Worlds* (both narrated by Neil deGrasse Tyson). That thirteen-part series is to begin March 9, 2020, on the National Geographic channels and then in the summer of 2020 on Fox channels. It'll ultimately be shown in 180 countries. Druyan has also written the companion book for that series.

Jim Underdown and Ann Druyan after the unveiling of CFI West's Carl Sagan & Ann Druyan Theater. "Carl would have loved it," she told the overflow audience. "Another candle in the dark!" Photo credit: Russell Orrell

Druyan said it was empowering "to be surrounded by people to whom it matters what's true."

Sagan gave keynote speeches at two CSICOP conferences, and both talks became cover articles in the Skeptical Inquirer. SI has also published numerous other articles by both Sagan and Druyan.

"I was a huge admirer of Carl," Richard Dawkins said from the audience at the October 21 inaugural festivities. "Carl was a modern Shakespeare."

Druyan, in her remarks, thanked Dawkins for that tribute and referred to Dawkins, in "this dark time" when science and reason are under attack, as "a shining light in the darkness."

Druyan said it was empowering "to be surrounded by people to whom it matters what's true." She said, "Science delivers the goods. You can't lie yourself to Mars." Space missions, she noted, require hundreds of thousands of steps, and all had better be done correctly. "None of them can be B.S."

She said the 2020 *Cosmos* series will "depict the awesome beauty" and power of science, and she hopes it will inspire a new generation to appreciate science's wonders and values.

That very day, the *New Yorker* had published online a feature article (it appeared in the October 28 printed issue) that explored the rising appeal of astrology to a younger generation of Americans looking for meaning in an uncertain world. There was no skepticism in it. Druyan found this discouraging. "Astrology is another form of prejudice," she said. "It judges a person on some things that are completely meaningless."

She ended by returning to the memory of her husband, Carl. He too was a person to whom it mattered deeply "what was true." She said she misses him every day "with every beat of my heart." She takes comfort from realizing that "his influence is even greater now than when he was alive."

"This theater—he would have loved it. Another candle in the dark! Here's to CFI. What an inspiring organization! From the bottom of my heart, I thank you for this great honor."

Kendrick Frazier is editor of the Skeptical Inquirer.

European Experts Demand Consistent Proof of Traditional Chinese Medicine

Edzard Ernst

The Federation of European Academies of Medicine (FEAM) and the European Academies' Science Advisory Council issued a joint statement on November 7, 2019, urging the World Health Organization (WHO) to clarify how traditional Chinese medicine (TCM) and other so-called alternative medicines (SCAMs) should be used.

The WHO has included TCM diagnoses in the International Classification of Diseases (ICD). (See "Quackery at WHO: A Chinese Affair," SI, September/October 2019.) The WHO claim this is not an endorsement, but experts point out that the move will promote TCM and mislead the public into thinking that TCM is safe and effective. Thus, consumers might use it as an alternative for effective treatments of serious conditions, in which case they would endanger their lives.

Prof. George Griffin, the president of FEAM, was quoted saying:

> We don't give drugs and surgical treatments unless there is real evidence that they work and do no damage and basically the feeling is that most of the traditional Chinese medicine drugs are unregulated. They are not tested properly for toxicity. They probably vary greatly between batches produced, for example seaweed, which is the latest, and they may be harmful. The other side of the equation is that they may be deluding patients into thinking they are taking appropriate therapies for serious disease.

"Multiple risks of harm from herbal ingredients have been documented," the joint statement warns. Sometimes herbal remedies have been adulterated with chemicals. Interaction with conventional drugs can be a serious threat. And acupuncture, they will say, "is not necessarily harmless." A review in 2017 as well as numerous papers discussed on my blog found injuries to vital organs, infections, and other adverse reactions.

Although those who use SCAM are being misled into thinking of it as originating from small-scale enterprises, globally it is big business. "The production and delivery of TCM has become a large industry with estimates of $60 billion a year and an annual growth rate above 10%," says the statement.

The statement authors "urge the European Commission and member states to do more to ensure that all medical products and procedures are subject to an appropriate level of evaluation for quality, safety, and efficacy consistent with standardized testing procedures."

For more details, see the website edzardernst.com or the full statement at easac.eu/publications/.

Edzard Ernst, MD, PhD, is emeritus professor at Exeter University, UK, and author of such books as *SCAM: So-Called Alternative Medicine* and *More Harm Than Good?* He's the recipient of the John Maddox Prize 2015 and the Ockham Award 2017, and he is a CSI fellow.

Whither National Geographic? SI Letter Protests Its Natural Healing Remedies Books

Kendrick Frazier

Readers will recall that the lead article in our recent "Health Wars" special issue (September/October 2019) critiqued a series of six newsstand books or "book-azines" on natural healing remedies published by National Geographic. Our cover article, by California physician Victor Benson, found they were full of claims "that lack scientific evidence, are inconsistent and internally contradictory, and don't reach minimal scientific standards." A second article, a more specific review by physician and SI contributing editor and columnist Harriet Hall, evaluated the most recent and largest of the books, *Nature's Best Remedies* (2019, 318 pages, $35). She found that the information in the book is "biased, incomplete, unscientific, and sometimes even dangerous. … A bitter disappointment."

National Geographic magazine itself still seems to exhibit its usual high editorial standards.

Both our authors, and I in my editor's column introducing the issue, expressed disappointment that such a cherished and usually responsible and fact-based organization as the National Geographic Society had issued and marketed these publications.

Credits listed in the books are minimal at best, but after our special issue came out, we sent copies of it to four top officials at the National Geographic Society, including Susan Goldberg, whose title is "Editorial Director and Editor, *National Geographic*."

After calling their attention to our main critiques, I wrote (on August 17):

> We all treasure the National Geographic Society and *National Geographic*. As I say in my editor's note, *National Geographic*'s articles and photographs cover the world with great insight. What are we to make, then, of these six books and book-azines? They fall far short of your usual high scientific and journalistic standards.

I ended this way:

> May I respectfully request that you and your colleagues carefully consider the criticisms in these articles. The books seem out of character for the distinguished National Geographic Society that we respect so much. We urge you to reconsider their further promotion and

> dissemination. That could limit the damage they cause with their scientifically misleading and even pseudoscientific claims and assertions.

Two months later no response had been heard, so on October 23, 2019, I emailed Goldberg, including the original letter and a new request and invitation:

Perhaps the nonscientific books on natural healing remedies were an aberration; most likely they were a purposeful money-making operation.

> Having heard no response, I now intend to publish my letter or key excerpts from it, in the News and Comment section of our next issue … deadline next Monday [October 28]. We want to give you the opportunity to present your reaction to the criticisms we published. I ask for your response.
>
> We stand strongly for science and reason and evidence-based thinking, and we have always assumed the National Geographic Society (or corporation) and its publications were on that side as well. Do you have any response to our published criticisms? Were we unfair? Are the books we critiqued anomalies? Does National Geographic still stand for good science and factual evidence? What can we expect in the future?

I told her we would like to include her response with this planned news article: "I am sure our readers would appreciate hearing your views."

What are we to make of this nonresponse? It is possible that as *National Geographic* magazine's editor in chief, Goldberg may not be directly involved with those six books and book-azines, but if that is the case my message asked her to forward our concerns to the appropriate person for reply. Without hearing their side, we can only speculate what's going on.

Some readers pointed to the fact that in September 2015 the National Geographic Society entered into a $725 million business arrangement in a new partnership headed by 21st Century Fox (which owned the famous movie studio, the Fox television network, and Fox News Channel) controlled by media giant Rupert Murdoch. This new "National Geographic Partners" got control of 73 percent of the society's assets (including the magazine, book, map, and other media assets), with the remaining 27 percent held by the National Geographic Society. Then in March 2019, The Walt Disney Company acquired 21st Century Fox, including its share in National Geographic Partners. So now the president of National Geographic Partners reports directly to the Walt Disney Television chairman.

National Geographic magazine itself (now "published monthly by National Geographic Partners," not the National Geographic Society) still seems to exhibit its usual high editorial standards. Some past issues deserve particular acclaim by science-minded people: Its March 2015 "The War on Science" special issue, which reported on attacks on climate science, vaccinations, evolution, the moon landing, and GMOs, was briefly highlighted in our May/June 2015 issue. Its January 2017 special issue the "Gender Revolution" ("Can science help us navigate the shifting landscape of gender identity?") was courageous in educating the public about all the new and perplexing gender-identity issues; it provided high-quality, science-based information, all of it sensitively written. Its current issue as I write (November 2019) is a special issue on "Women: A Century of Change," its first in which, as Goldberg writes, "all contributing writers, photographers, and artists are female." The issue includes two insightful articles on women in science.

Topics of the company's current book-azines on newsstands include history, marijuana, and genes. And the National Geographic television channel (along with Fox TV channels) aired Ann Druyan's 2014 renewal of the *Cosmos* series and plans to do the same for the second season (both hosted by Neil deGrasse Tyson), forthcoming in 2020. In 2016, Bloomberg reported that rather than the National Geographic channel being pushed toward tabloid fare, it has been given "a radical makeover in the opposite direction" with millions of dollars invested in highbrow entertainment, "a kind of HBO for science and adventure programming." The channel's 2018 ten-part flagship series *One Strange Rock*, the story of life on earth from the perspective of eight astronauts (narrated by a genuinely amazed Will Smith), was compelling fare.

Looking at National Geographic's recent output in total, I see less reason to fear that the National Geographic brand is in danger of becoming tainted.

So we are hardly giving up on National Geographic. Perhaps the nonscientific books on natural healing remedies were an aberration; most likely they were a purposeful money-making operation started when the organization was strapped for funds. Looking at National Geographic's recent output in total, I see less reason to fear that the National Geographic brand is in danger of becoming tainted. Will it remain the reliable source of solid scientific information it has been throughout most of its history? Let's hope.

Kendrick Frazier is editor of the SKEPTICAL INQUIRER.

Cosmos: Possible Worlds to Premier March 9, 2020

Cosmos: Possible Worlds will debut on National Geographic channels March 9, 2020, and on Fox channels in Summer 2020, it was announced in November. Skeptical Inquirer readers may remember we were allowed to visit the set for part of the filming at Santa Fe Studios in 2018 (September/October 2018).

Cosmos: Possible Worlds will debut on National Geographic channels March 9, 2020.

This is the long-awaited sequel to the 2014 *Cosmos: A Spacetime Odyssey,* the thirteen-part television series created by Ann Druyan and narrated by Neil deGrasse Tyson.

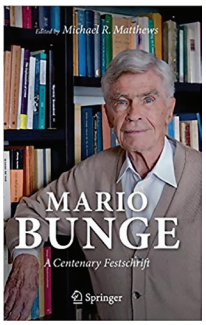
Druyan cowrote the original 1980 *Cosmos* series with Carl Sagan, whom she married in 1981, and also spearheaded the 2014 version. She is writer, co-executive producer, and codirector of the 2020 series, again narrated by Tyson. Druyan's 352-page companion book of the same title is due out February 25.

Patrick Stewart, Viggo Mortensen, and Judd Hirsch will portray scientists in the series, and Seth MacFarlane (also executive producer) will join the cast as President Truman. Author Sasha Sagan, daughter of Druyan and Carl Sagan, will portray Carl Sagan's mother in a recurring role.

"This third season of *Cosmos: Possible Worlds* is our boldest yet," Druyan said in a statement. "The 'Ship of the Imagination' will carry us places we never dared to venture before: lost worlds and worlds to come, deep into the future and straight through that hole in the curtain masking other realities—and all of it rigorously informed by science and made real by lavish VFX."

Science, Philosophy, and a Lifetime of Reason: A Mario Bunge Centenary Festschrift

Kendrick Frazier



Philosopher of science Mario Bunge has been honored with the publication of *Mario Bunge: A Centenary Festschrift,* an 827-page volume with forty-one chapters by scholars from sixteen countries written to honor him on his 100th birthday (September 14, 2019). Bunge is a longtime fellow of the Committee for Skeptical Inquiry and has written several key articles on science and pseudoscience for Skeptical Inquirer.

Born in Buenos Aires and trained as a physicist with a doctorate in mathematical physics, Bunge eventually emigrated first to Europe and then to Montreal, Canada, where in 1966 he joined the philosophy department at McGill University, with which he has been affiliated ever since. Bunge was the Frothingham Professor of Logic and Metaphysics at McGill until his retirement in 2011 and is now professor emeritus of philosophy.

He is the author of more than eighty books and some 540 articles, many of them devoted to his task of achieving a synthesis of rationalism and empiricism. Such works as *Foundations of Physics* (1967), *Philosophy of Science* (1998, two volumes), and his massive eight-volume *Treatise on Basic Philosophy* (1974–1989) defended conceptions of materialism and humanism.

Mario Bunge is the author of more than eighty books and some 540 articles, many of them devoted to his task of achieving a synthesis of rationalism and empiricism.

The contributions in the new book in his honor, published by Springer International, aim to show the value of Bunge's science-informed philosophy and his systematic approach to philosophical problems. The chapters explore what Editor Michael R. Matthews of the University of New South Wales, Sydney, calls "the exceptionally wide spectrum of Bunge's contributions." They deal with the philosophy of science, of mathematics, of psychology, of physics, of social sciences, of biology, and of medicine as well as with metaphysics and the methodology and philosophy of science broadly.

In his scholarship, Matthews writes, Bunge's unifying thread is "the constant and vigorous advancement" of Enlightenment thinking "and criticism of cultural and academic movements that deny or devalue" its core planks, "namely naturalism, the search for truth, the universality of science, rationality, and respect for individuals. … At a time when specialization is widely decried …, it is salutary to see the fruits of one person's pursuit of the 'Big' scientific and philosophical picture."

In an emailed note to colleagues about the book, Alfonso Lizarzaburu, a Paris-based Peruvian educator, philosopher, and UNESCO consultant, says Bunge is "curious, open-minded, critical, creative, courageous, lucid, insightful, rigorous, and systemic to whom nothing human is alien. At the age of 100, he continues to make his life his masterpiece, and he impels us to push the limits of our ignorance and courage in order to live a good life."

Bunge's unifying thread is "the constant and vigorous advancement" of Enlightenment thinking.

Lizarzaburu calls the number of publications Bunge has produced in such a wide variety of fields "astonishing." And he adds, "I agree with what Laurent Jodoin asserts on Mario Bunge: He is undoubtedly one of the greatest sciences philosophers of the twentieth century. And he has everything needed to be in the present century."

Among Bunge's essays on science and pseudoscience is "The Philosophy of Pseudoscience" (Skeptical Inquirer, July/August 2006). In it he points out that science and pseudoscience each have philosophical ideas behind them. But they are totally different ideas and "orthogonal" to each other, totally at odds. When we published it in SI, I wrote that in my view "it provides a comprehensive, explanatory, intellectual, philosophical framework for virtually every issue we address in the Skeptical Inquirer." Bunge argues that his "exercise in border patrolling" can help distinguish between good and bogus science and reveal why research guided by the wrong philosophy is likely to fail.

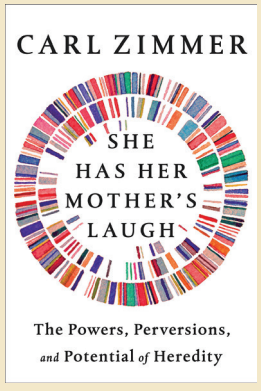
Decades earlier, Bunge wrote "What Is Pseudoscience?" (SI, Fall 1984), another seminal essay that listed and described several attitudes and activities by which to compare scientists and pseudoscientists. It provoked some controversy but still stands up well.

Bunge's 2013 book *Medical Philosophy*, Bunge said, was the first that "analyzes and systemizes all the general ideas of medicine." He pointed out that whether doctors realize it or not, medicine is firmly based on the philosophical principles of materialism, systemism, realism, scientism, and humanism. In her review in our January/February 2014 issue, physician and SI contributing editor Harriet Hall called it "full of insight and wisdom" and "a mind-stretching book."

James Alcock reviewed Bunge's 500-page memoir, *Between Two Worlds*, in our March/April 2017 issue. He pointed out that "staunch opposition to pseudoscience" has been a constant factor throughout Bunge's academic career and that Bunge has always embraced "methodological rather than absolute skepticism." "Methodological skeptics, he tells us, doubt only the insufficiently substantiated claims, reject the groundless ones, and suspend belief on untested propositions." The memoir "reveals a man of exceedingly high confidence who has lived his life guided by strong principles about truth, science, and justice."

Carl Zimmer Wins NASW Science Book Award

Carl Zimmer, who spoke at CSICon 2018 and subsequently published a well-received article "Seven Big Misconceptions about Heredity" in the May/June 2019 Skeptical Inquirer, has won the 2019 Science in Society Journalism Award in the book category from the National Association of Science Writers (NASW). The award is for his book *She Has Her Mother's Laugh: The Powers, Perversions, and Potentials of Heredity*, published by Dutton. Winners receive a $2,000 cash award.



The NASW judges called Zimmer's book "a deep and many-layered dive into the science of heredity and a well-woven history of our understanding of the term." The judges called it "a very humane book" that is "astonishing in its comprehensiveness."

IIG Test Report: From Just a Photo, Can Someone Tell If a Person Is Dead or Alive?

Lou Hillman and Stan West

The Independent Investigation Group (IIG) has had a standing offer of $100,000 to anyone who can demonstrate they have a paranormal power under controlled conditions.[1] In October 2018, Mirko Janchevski, a man of about sixty from Kumanovo, Macedonia, applied for our challenge. He claimed to be able to tell if someone is alive or dead by looking at a photograph of the person. He claimed an accuracy of "around 90%–100%" and said "there are no limitations to my power."

Our negotiator Stan West and Mr. Janchevski spent about six months working out a protocol for the demonstration. This is a typical timeframe for negotiations, especially for a test that will happen via internet.

On Saturday, May 18, 2019, at our monthly meeting, Janchevski appeared via Skype as scheduled, with his daughter to translate for him when necessary. We told the daughter that once the test started, she would need to remain visible. She asked why, and West explained that this was to prevent the use of any "super duper Google search ability" to find photos of the subjects and determine if they were alive. She understood and agreed to stay visible, which she did. The entire session was recorded using the built-in capability of Skype; audio was recorded separately on a sound recorder, and the session was videoed on a camera that pointed at the laptop.

Jim Underdown, founder and chair of the IIG and executive director of the Center for Inquiry West, presented the photos. He had no idea of the status of the people in the photos and thus could not inadvertently bias the demonstration; this allowed it to be double-blinded. The numbered photos were stacked face down on his right. Each photo was marked on its face "Mirko" plus a number. The numbers did not run consecutively because after they had been printed and numbered, it turned out that some photos were not usable. However, a chart was constructed on which the presentation order and photo numbers were written, for instance: 1, #23; 2, #4, etc.

A man of about sixty from Macedonia applied for the IIG challenge. He claimed to be able to tell if someone is alive or dead by looking at a photograph of the person.

The photos were printed in black and white on a (U.S.) standard 8.5 x 11 inch piece of paper, with a border around them, one photo to a page. Underdown displayed each photo for ninety seconds or until Janchevski declared the status of the person, whichever was shorter. When Underdown displayed the photo via the camera in the laptop, he held a piece of cardboard behind the paper so that he (Underdown) could not see the photo.

As soon as Janchevski announced his decision, Underdown repeated it and then turned to his left, where another member used a permanent marker to write "dead" or "alive" across the photo. Underdown then turned toward the separate camera to show the writing, and then back to the laptop and showed Janchevski the photo, announcing the status again. He then put the photo into a stack on his left. This procedure was used for all twenty photos.

After Janchevski was shown a photo, he looked down and concentrated. At first, we did not understand the reason for this, but at one point his right hand was high enough that we could see it moving. After the demonstration was completed, discussion among the audience indicated that most of them thought he was using a pendulum to make his decisions. (Later, this deduction was verified, as mentioned below.) Janchevski's first eight or nine determinations were all "dead." Several members of the audience wondered if he was going to continue this in hope of winning by the off chance that all the photos were of dead people.

After the last photo was identified, a sealed envelope was opened. This contained a duplicate set of photos, identified by the same numbers as the first set, showing the status of the person in the photo. Underdown showed Janchevski both the photo he originally identified and the previously marked photo, while asking our scorekeeper whether Janchevski had identified the person's status correctly. This allowed Janchevski to verify that we weren't switching photos and that both photos depicted the same person.

To pass the initial demonstration, Janchevski had to correctly determine the status of eighteen of the twenty people whose photos he saw. He determined eleven correctly. After the demonstration finished, Janchevski asked to see one of the photos again. After looking at it and consulting his pendulum (now visible via Skype), he declared that the person was dead, not alive. West moved to where Janchevski could see him and told Janchevski that

the person is West's father, with whom he had had a conversation the previous night.

When Underdown asked Janchevski if he had any explanation for the result, Janchevski said that perhaps the interval between photos was too short, and perhaps the weather had an effect. We did not ask about the weather conditions at the time, nor about the reason weather might affect his abilities.

To pass the initial demonstration, Janchevski had to correctly determine the status of eighteen of the twenty people whose photos he saw. He determined eleven correctly.

Underdown asked Janchevski if there was anything else he wanted to share. Janchevski offered to diagnose Underdown's health; Underdown agreed. Janchevski diagnosed problems with Underdown's back and with veins in his neck. Unfortunately for Janchevski, Underdown has no health problems in either area. Underdown thanked Mr. Janchevski for his time and told him that he would be welcome to apply again after a year has elapsed.

Note

1. IIG has since been subsumed into CFI, with a new name: Center for Inquiry Investigations Group (CFIIG). Its former $100,000 prize has now been increased to $250,000. These changes were announced at CSICon 2019 in October.

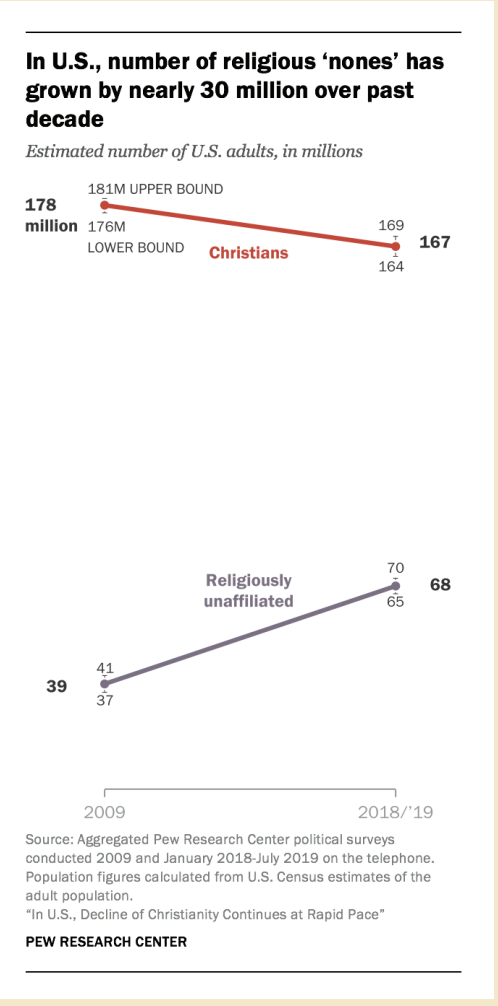
Lou Hillman is the Challenge Coordinator for the Center for Inquiry Investigations Group based at CFI West in Los Angeles, California. He is a retired college professor with a PhD in linguistics. Stan West works in the financial industry and is one of CFIIG's "first responders"/negotiators.

More Americans Reporting No Religious Affiliation

The proportion of Americans saying they have no religious affiliation is rising significantly, while the proportion identifying as Christian is sharply dropping, according to a new survey from the Pew Research Center released October 17, 2019.

Pew said that the percentage of American adults surveyed who describe their religious identify as atheist, agnostic, or "nothing in particular" now stands at 26 percent, up from 17 percent in 2009. Those describing themselves as Christian now stands at 65 percent, down from 77 percent in 2009.

According to Pew, all categories of the religiously unaffiliated—often referred to as Nones—grew. It said self-described atheists now account for 4 percent of U.S. adults, up from 2 percent in 2009. Agnostics account for 5 percent, up from 3 percent in 2009. Those who describe their religion as "nothing in particular" now compose 17 percent of the population, up from 12 percent in 2009.



The results reinforce several other recent surveys finding that those who might be described as Nones now account for more than a quarter of the nation's adult population as people disaffiliate from organized religions. Both Protestant and Catholic ranks are losing population share, Pew reports. The trends hold up in all four geographical regions of the country.

There is also a wide generational gap. Older people tend to self-identify as Christian at a far higher rate than younger people. "Indeed," says the Pew report, "there are as many Millennials who say they 'never' attend religious services (22%) as there are who say they go at least once a week (22%)." Women are still slightly more religious than men, but "the share of 'nones' among women has risen by 10 percentage points since 2009—similar to the increase among men."

The latest Pew survey was conducted by random-digit-dial polling on the telephone (both cell phones and landlines) in 2018 and 2019. Sampling error is plus or minus 2.9 percentage points. Full details and charts are available at https://www.pewforum.org/2019/10/17/in-u-s-decline-of-christianity-continues-at-rapid-pace/.

New RNA Research Demonstrates Prebiotic Possibility

DAVID W. BALL

Creationists and other religious fundamentalists commonly (and erroneously) bring up the issue of abiogenesis as an argument against evolution, claiming that life is too complex to have arisen naturally from simple (nonliving) chemicals. Abiogenesis is the development of chemical life from nonliving chemicals. It is an active area of research for scientists studying "origin of life" questions. The issue is largely irrelevant as an argument against evolution because evolution deals with what happens after life is formed.

It is widely accepted that modern abiogenesis research traces back to the Miller-Urey experiment, performed by Stanley Miller at the University of Chicago (with assistance from Harold Urey) and published in 1953. In this experiment, Miller mixed some simple chemicals thought to be components of the prebiotic atmosphere and exposed them to an electric discharge for a week. After that time, analysis of the contents showed the formation of several amino acids. (Recent reanalysis of sealed samples using modern techniques indicated the presence of more than twenty amino acids, some of which are non-proteinogenic, i.e., not known to be used in protein synthesis.) Since that time, countless additional experiments have been performed that demonstrate the generation of the building blocks of life from nonliving chemical sources. (A good summary of abiogenesis can be found at the Talk Origins website, talkorigins.org.)

Countless experiments have been performed that demonstrate the generation of the building blocks of life from nonliving chemical sources.

However, life is complex (irreducibly so, claim some creationists, although none of their claims have held up to scrutiny), and while all the fundamental building blocks of life have been identified in at least some abiogenesis experiments, getting all of them at the same time has been a challenge. Recent research has focused on the components of ribonucleic acid (RNA), because one currently favored hypothesis is that RNA developed on primordial earth before deoxyribonucleic acid (DNA) did. RNA comprises three units: a phosphate group (one phosphorus atom connected to four oxygen atoms), ribose (a type of sugar molecule), and a cyclic nitrogen-containing fragment called a base. There are four different types of bases found in RNA: adenine, cytosine, guanine, and uracil. Cytosine and uracil are in a class of molecules called pyrimidines that contain a six-atom ring, while adenine and guanine are in a class called purines that have one six-atom ring and one five-atom ring. A particular challenge in abiogenesis research has been to identify conditions that generate both the purine and pyrimidine bases simultaneously, as both types of bases are needed for RNA (and DNA) synthesis. To date, synthetic models have produced only purines or only pyrimidines, but not both under the same conditions.

Until recently, that is. In the October 4, 2019, issue of *Science* magazine, a group of ten researchers from Germany, the United Kingdom, and Japan published a study (Becker et al., *Science*, volume 336, 76–82) that demonstrates a plausible synthesis of both purines and pyrimidines from likely primordial starting materials (formaldehyde, hydrogen cyanide, urea, and other small molecules) in the presence of metal compounds containing zinc, cobalt, and iron (all known to be present on earth in a variety of rocks). In the presence of ribose and phosphate-containing minerals, the researchers were able to demonstrate the formation of the phosphate-ribose-base triads that ultimately make up RNA.

One key part of the so-called "one-pot" synthesis was the cycling of conditions from dilute aqueous solutions ("wet") to significantly more concentrated solutions ("dry"), which would occur in, say, isolated pools or on land, where excess

water would evaporate. By doing this, the researchers were able to avoid extreme conditions of temperature and pH that would degrade complex molecules—experimental temperatures ranged between 10° and 95°C (50° to 203°F) and the pH never exceeded 10 (considered slightly basic; for comparison, this is the approximate pH of milk of magnesia, a common antacid). Also by doing this, the researchers were able to avoid using external sources of energy such as electric sparks (to simulate lightning) or temperatures outside the liquid-water range (to simulate atmospheric or oceanic volcanic activity) that some argue would be too infrequent to allow for formation of significant amounts of biotic material. Finally, it is worth pointing out the time scale of the experiments: Experimental durations were cited to be as short as two hours and as long as three weeks—a blink of an eye on cosmic time scales (or 6,000 years, for that matter).

This research adds to the mountain of evidence suggesting that the chemicals of life may be a product of chemical inevitability and not chance (or creation).

This research doesn't mean we know how life arose from prebiotic earth, but it establishes that there exists a plausible, simultaneous chemical synthesis of all four bases found in RNA that uses starting molecules and conditions likely to be present billions of years ago. In other words, this research demonstrates that *it's possible*. (Or, in the words of Dr. Ian Malcolm in *Jurassic Park*, "Life finds a way.")

Even if abiogenesis were a valid argument against evolution, this research adds to the mountain of evidence suggesting that the chemicals of life may be a product of chemical inevitability and not chance (or creation). Now, if anyone were to convincingly demonstrate that it was chemically *impossible* to make the molecules of life from reasonable starting materials and conditions, then maybe creationists' arguments might be taken more seriously. But then, creationists are better known for their contributions to specious rhetoric than they are for peer-reviewed scientific research, aren't they? ■

David W. Ball is a professor of chemistry at Cleveland State University.

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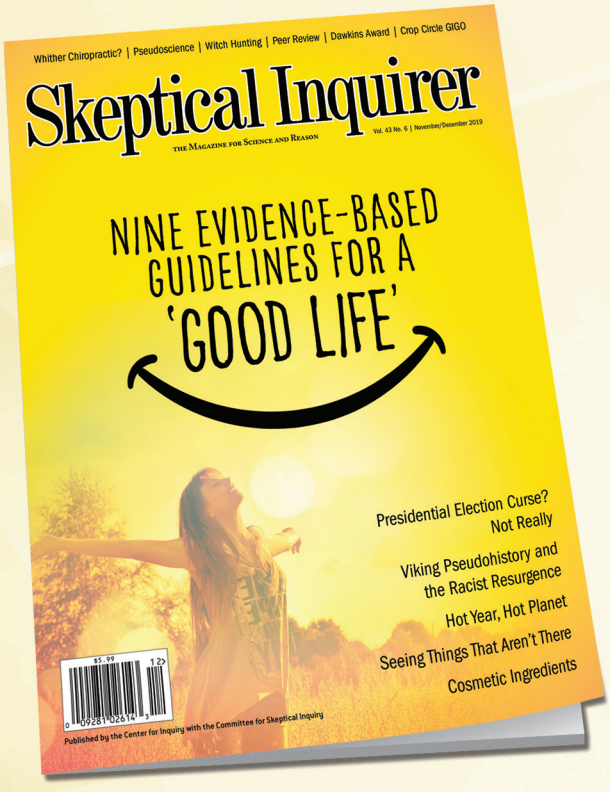
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Joe Nickell, PhD, is CSI's senior research fellow and author, coauthor, or editor of some forty books.

Firebug Poltergeists

A poltergeist is said to be a sort of prankster entity, after the German word for a "noisy" (*poltern*) "spirit" (*geist*). Poltergeist phenomena include mysteriously thrown objects, strange noises, or unusual fires (Nickell 1995, 79). Those who promote belief in poltergeists often attribute the effects—fiery or otherwise—to the repressed hostilities of a child or other person in the vicinity, which are somehow manifested as kinetic energy, supposedly a psychic force (Fodor 1968, 51). Skeptics have a simpler explanation: they are the cunning pranks of a mischievous youth or disturbed adult. I have therefore attributed cases having such a *modus operandi* to what I call the "poltergeist-faking syndrome" (Nickell 2012, 331; Bartholomew and Nickell 2015, 129, 136–137).

An early example occurred in 858 CE near the German town of Bingen, located on the scenic Rhine River (along which, in 2002, I conducted several investigations[1]). There is too little evidence to indicate more than a cursory explanation for such a case at this remove, but it contained familiar elements: A farmhouse was assailed by showers of stones, crops were set ablaze after they were harvested, and the poltergeist even developed a voice (the source apparently hidden) that denounced the farmer for a variety of sins. Related in the Frankish chronicles *The Annales of Fulda*, the case eventually ended as suddenly as it began (McCabe 1849, 2, 73; Wilson 2009, 83–84).

Although in this case fire was only one of the phenomena, in some poltergeist outbreaks it is the sole agent of disturbance. Here is a look at some notable historical examples I have investigated, albeit necessarily as very cold cases.

Bladenboro Fire Poltergeist

This important case transpired in 1932 and went unsolved until 2016, when reporter Jimmy Tomlin engaged my interest with some news clippings ("Blazes" 1932; Bridger 1932; "Mysterious" 1932; "Very Puzzling" 1932; and others listed in Tomlin 2016). The outbreaks occurred in a house on Elm Street in the small town of Bladenboro, North Carolina. Police and others, including fire experts, were baffled by the fires that occurred over three days in the home of an elderly couple, Council H. Williamson and his wife, Lydia, together with their daughter Katie, aged about twenty-one.

Beginning on January 30 with a burning curtain and window shade in the dining room and continuing the following day with a set of bedclothes, a stack of papers stored in a closet, and a hanging pair of trousers, the rash of what would come to be twenty mysterious fires ended about noon on February 1. Soon, however, the fiery case went cold and, according to Tomlin's article for *Atlas Obscura*, remained unsolved (Tomlin 2016)—until I came to provide the probable solution.

An account of the Bladenboro case was offered by the notorious mystery-mongering writer Vincent H. Gaddis (1967, 188–189). However, relying on an earlier doubtful source, itself written a quarter century after the events, Gaddis makes serious errors. Many modern accounts of the Bladenboro fires, clearly copying Gaddis, repeat the misinformation, which helps make the case seem inexplicable. For example, Gaddis claims the fires continued in the house even after the Williamsons briefly moved out, and he imagines an elaborate scenario involving police, electricians, and arson and gas company experts being plagued by the further outbreak. In fact, volunteer guards having patrolled the bungalow through the night while the family stayed with friends, no further incidents occurred ("Very Puzzling" 1932).

Taking on the case, I soon saw from contemporary news sources that it was consistent with the hypothesis of the poltergeist-faking syndrome. Not only were the reported incidents attributable to a person in the house, but in fact they seemed to indicate the Williamsons' daughter.

Corroboratively, the first fire, involving the dining room shade and curtain,

had begun "starting from the bottom of the shade" (Bridger 1932)—just where a person could easily reach. While fire attacked several articles of clothing, only in a single instance was one being worn and that was the dress of the daughter herself—further making her our suspect. And it seems that she was present—if perhaps surreptitiously so—for the other incidents as well.

Again and again in such poltergeist cases having sufficient activity, we observe that incidents tend to center on a particular suspect—or, rarely, suspects, as occurred for instance after fiery disturbances in a North Dakota rural schoolroom in 1944. Four pupils would come to admit they had been responsible, using matches. They lit and hurled lumps of coal, set fire to curtains and a wall map, and otherwise wreaked havoc over several days. They finally confessed that they and others had found their teacher—and then their parents and authorities—so gullible that they could not resist the mischief, and they thrived on the resulting excitement and publicity (Christopher 1970, 146–149).

The Bladenboro case is tame by comparison. Although the evidence for a probable explanation is not as detailed as desirable, it is nevertheless sufficient to demonstrate that the events are explainable by simple human agency and that that hypothesis wins easily over any invoking the paranormal. It follows the rule of Occam's razor, that the hypothesis with the fewest assumptions is to be preferred. It is simply not necessary to suggest that a spirit may have somehow sparked (so to speak) combustion, when someone with matches is all that would have been required.

Flatrock 'Haunting'

Another case—a reputed "haunting" that was really of the fire-poltergeist genre—took place in the Canadian province of Newfoundland and Labrador in 1954. (I learned of the case on a tour of the province that began with my participating in an episode of the popular TV series *MonsterQuest* [Nickell 2009] and took me to additional sites, including the ancient Viking settlement of L'Ance aux Meadows [Nickell 2016].)

The site of the mid-November outbreak had been the home of a Mike Parsons at Flatrock, north of Carbonear, on Conception Bay. According to a Canadian Press news report of December 11, 1954:

> Over a two-week period the five members of the family were alarmed when the following incidents occurred at intervals of two or three days. A dictionary burst into flames for no apparent reason. A sack of sugar ignited of its own accord. A box of religious literature, stowed in an upstairs bureau, turned into a bonfire. A blaze appeared under the eaves of the house. The floorboards in one room of the house flared up. Finally, a doll was consumed in flames. (quoted in Butts 2010, 180)

Four students confessed that they and others had found their teacher so gullible that they could not resist the mischief, and they thrived on the resulting excitement and publicity.

A reporter touring the home was shown "the telling evidence of unnatural goings on"—as one ghost raconteur phrased it (Butts 2010, 181). An investigation was conducted by the Royal Canadian Mounted Police, but officers could find no explanation for the mysterious flames. They so informed the Attorney General who had no comment. Then in just two weeks, the excitement was over, and the strange case faded into obscurity.

The old accounts lack details that could provide useful clues to the actual source—now generally referred to as a *poltergeist*, although that term was not used in the news stories of the time. Instead, they refer to "mysterious fires," a "rash of flames," and the like.

As given by the accounts, the household consisted of Parsons, his wife, their daughter, a granddaughter, and Uncle Jim. The two men were milking cows during one incident and so are alibied, and Mrs. Parsons seems an unlikely poltergeist—statistically on account of age. That leaves only the daughter (presumably the mother of the grandchild), who was in the kitchen with her mother during at least one incident (involving a burning sack of sugar), and the granddaughter, about whom nothing was related. She appears to have been an adolescent, and so a possible suspect, but the matter is largely academic at this point.[2]

My old friend, John Robert Colombo—the erudite Toronto author,

editor, and poet—includes this case in his book *Mysterious Canada* (Colombo 1988, 5). He describes the pyromaniac poltergeist phenomenon as one "familiar to the curious … the frightening one of mysterious fires which break out unexpectedly for no known reason." But not knowing the motivation in this case—such as the need for attention or resentment of strict, religious parents—should not keep us from seeing that it was the work of a secretive and opportunistic *person* and is not fundamentally mysterious after all.

Such mystery as there is with fire poltergeists seems largely attributable to their rarity. As D. Scott Rogo (1979, 176) acknowledges, "We simply do not have the type of detailed data on them that we possess on more conventional cases."

'Voodoo' Fires of Alabama

This next example—solved at the time—helps illuminate the preceding cases. And some minor puzzles it presents are ones I believe we can solve even at this late date.

The case was reported by the Associated Press and carried in an Alabama newspaper, *The Gadsden Times*, on Monday, September 15, 1958. The headline read, "Mystery Fires Cause Negro to Move Again." Thus continued what D. Scott Rogo called, in his *The Poltergeist Experience* (Rogo 1979, 165), "one of the most bizarre poltergeist outbreaks ever recorded."

The site was the Talladega, Alabama, cabin home of Calvin Tuck, thirty-two, his wife, and six children (ranging in age from six months to nine years). The fires had begun on August 25, with three small blazes. When they continued the next day, Tuck called the fire department, and on August 28, before reporters, spectators, firemen, and police, no fewer than seventeen separate blazes burst forth. As the horror continued, the family moved to a second home (that of Tuck's brother) and then, on September 2, to a third (that of his father)—leaving fire damage in their wake each time.

By then, several fire officials and police were investigating what some of the former thought had some freakish explanation and what the latter were convinced was the work of a clever arsonist. Several of the fire investigators agreed with the police. Rogo (1979, 167) states that "household items failed to show any telltale signs such as chemical residue," but another source (Taylor 2002) cites an Alabama State Toxicology lab report that mentioned finding traces of phosphorous. This was apparently dismissed out of hand, because the question arose, who in the family would have known how to obtain and use (e.g., to emulsify and spray) the chemical?

It is simply not necessary to suggest that a spirit may have somehow sparked (so to speak) combustion, when someone with matches is all that would have been required.

During the affair, Calvin Tuck consulted an "herb doctor" (a voodoo practitioner) who provided Tuck with a magic spell and instructions for making a "medicine" that would purportedly serve as an antidote to the fire. Not surprisingly, it did not work, but it led to the case being dubbed "The Voodoo Fires of Alabama" (Rogo 1979, 166, 168). As Talladega Fire Chief W.C. Holmes pointedly observed: "There's no such thing as magic fires. … Those fires are being caused by something or somebody." He suspected the latter.

Then, on September 22, police at Anniston announced that the case was solved. Nine-year-old Calvin Tuck Jr. had admitted he was the culprit. The boy confessed that he had used matches to set the blazes, and two of his younger siblings corroborated his statement, having known what Calvin Jr. was doing. Thus, the four-week rampage that had resulted in some fifty-two blazes came to an end—a fact that underscores the truth of the confession. Young Calvin's motive had been to cause his family to return to Birmingham, from which they had moved and where all his friends still lived (Rogo 1979, 167; Taylor 2002).

Nevertheless, some of the staunch believers in the reality of poltergeists in general and in the Alabama fire poltergeist in particular, would have none of this. D. Scott Rogo (1979, 167–168) argued that confessions in such cases were not uncommon but should not be believed when they could not explain the unexplainable. Troy Taylor (2002) echoes this view, only grudgingly accepting the possibility that the confession could be genuine. He and Rogo each attempt to unsolve the mystery.

Here are some of the arguments believers use to keep the mystery alive:

• Calvin Jr. was "often absent when the fires appeared" (Taylor 2002). However, for "absent" we should say "unseen" because the rambunctious and deliberately secretive child's whereabouts were simply unknown. Magician Milbourne Christopher (1970, 157) sagely advises that "poltergeists" were commonly not where they said they were but instead where the mischief occurred.

• Calvin Jr. reportedly described using matches as well as placing smoldering rags so they would later burst into flames. If true, this could explain how two witnesses "saw a fire start literally in front of their eyes." Taylor (2002) thought this technique too clever for a nine-year-old, but why? The boy was obviously very clever.

• Many of the fires seemed to ignite at or near the cabin's ceiling, "out of the reach of a young child" (Rogo 1979, 164, 168). I suspect the boy had snuck upstairs where he put matches through spaces between floorboards.

• Dubious comments were made about the "color of the flames," supposedly precluding matches (Rogo 1979, 168). However, the flame color would have been due to the composition of the burning material—not that of the match that lit it.

• Regarding the traces of phosphorous (supposedly unavailable to a boy), those would surely have come from the "kitchen matches" (the strike-anywhere type) of the era. Therefore, the traces of that chemical actually help corroborate Calvin Jr.'s story.

It seems obvious that believers in poltergeists are desperate to dismiss rational explanations, yet science has never authenticated a single such entity. We can see that poltergeists depend on a lack of knowledge for their very existence. Facts are a threat to them.

Macomb Firebug

A look at one more case emphasizes the difference a confession makes. This outbreak took place in August 1948 on the farm of the Charles Willey family outside Macomb, Illinois. According to Vincent Gaddis (1967, 195), "No story of strange fires ever received more publicity."

The blazes began by selectively attacking paper. Brown spots would appear on the home's wallpaper, then spread and burst into flames. This phenomenon (reminiscent of that in the Alabama case) reportedly occurred on walls and ceilings. Fire also attacked shelf paper in a cupboard, newspapers stored in a box in the chicken house, and more newspapers found smoldering elsewhere on a shelf. Curtains and other cloths were attacked. Meanwhile the fires intensified, and the family fled to a vacant building nearby. Then on Saturday, August 14, their home burned, and the next day their first barn burned. Several fires sprang forth on the milkhouse walls on Tuesday, and on Thursday the second barn burned down (Gaddis 1967, 196–197; "Mystery Fires" 1948).

On August 30, the pyromania ceased. At the house where the family had moved, a deputy fire marshal had set a box of matches in view, placed in a certain position. Later, it had been moved, and one of the two children in the household, Willey's thirteen-year-old niece, was nearby. An hour's grilling by the deputy marshal and a state's attorney yielded a confession from the very unhappy girl.

Named Wanet, she and her eight-year-old brother lived on the farm with their father, Arthur McNeil, who was Willey's brother-in-law. He was divorced but had custody of the children, whom Mrs. Willey (their Aunt Lou) was helping to care for. The children's mother resided in Bloomington.

Wanet wanted to be with her mother. She missed her and the pretty clothes she never had. A psychiatrist confirmed that the confession was genuine, explaining, "She's a nice little kid caught in the middle of a broken home."

Not knowing the motivation in this case should not keep us from seeing that it was the work of a secretive and opportunistic person and is not fundamentally mysterious after all.

Things soon improved all around. The Willeys received insurance money for their home and barns. And Wanet was placed in the custody of her maternal grandmother, tying her more closely to her own mother. The "poltergeist" went away—lurking only in the minds of believers still intent on pseudoscientific explanations. ■

Notes

1. See Nickell 2012, 33–34.

2. CFI Libraries Director Tim Binga greatly assisted with research in this area. The daughter's name "Josephine" seems an error (or perhaps her other name), based on family information listing her as Eileen, born December 19, 1913, and so about forty-two at the time of the incidents. (See "Michael Joseph Parsons" 2019.)

References

Bartholomew, Robert E., and Joe Nickell. 2015. *American Hauntings.* Santa Barbara, CA: Praeger.

Blazes are mystery at Blandenboro [*sic*]. 1932. *Daily Times-News* (Burlington, NC) (February 1).

Bridger, Mrs. R.C. 1932. Strange phenomenon puzzles citizens—fires break out most unaccountably. *The Robesonian* (Lumberton, NC) (February 1).

Butts, Edward. 2010. *Ghost Stories of Newfoundland and Labrador*. Toronto: Dundurn Press.

Colombo, John Robert. 1988. *Mysterious Canada*. Toronto: Doubleday Canada Limited.

Christopher, Milbourne. 1970. *ESP, Seers & Psychics: What the Occult Really Is*. New York: Thomas Y. Crowell.

Fodor, Nandor. 1968. *The Haunted Mind*. New York: Signet Mystic Books.

Gaddis, Vincent H. 1967. *Mysterious Fires and Lights.* New York: Dell Publishing.

McCabe, William Bernard. 1849. *A Catholic History of England*, in 2 vols. London: T.C. Newby.

Michael Joseph Parsons. 2019. Available online at https://www.ancestry.com/family-tree/person/tree/71480735/person/40287284700/facts?_phsrc=YqZ32&_phstart=successSource; accessed April 9, 2019.

Mysterious fires occur in residence. 1932. *Daily Times-News* (Burlington, NC) (March 2).

Mystery fires cause Negro to move. 1958. *The Gadsden Times* (Gadsden, Alabama) (September).

Mystery fires plague farmer, home and barns go up in smoke. 1948. *Pittsburgh Press* (August 20).

Nickell, Joe. 1995. *Entities: Angels, Spirits, Demons, and Other Alien Beings*. Amherst, NY: Prometheus Books.

———. 2009. Quest for the giant eel. Skeptical Inquirer 33(4) (July/August): 18–20.

———. 2012. *The Science of Ghosts: Searching for Spirits of the Dead*. Amherst, NY: Prometheus Books.

———. 2016. Otherworldly: Mysteries of Newfoundland and Labrador. *Skeptical Briefs* 26(1) (Spring): 5–8.

Rogo, D. Scott. 1979. *The Poltergeist Experience*. 1979. New York: Penguin Books.

Taylor, Troy. 2002. The Alabama fire poltergeist. Available online at http://www.prairieghosts.com/al_fire.html; accessed February 18, 2019.

Tomlin, Jimmy. 2016. North Carolina's 1932 series of spontaneous combustions is still unsolved. Available online at https://www.atlasobscura.com/articles/north-carolinas-1932-series-of-spontaneous-combustions-is-still-unsolved; accessed January 19, 2016.

The very puzzling mystery of the Bladenboro fires. 1932. King Features Syndicate, in *The Ogden Standard Examiner* (Ogden, NC) (March 13).

Wilson, Colin. 2009. *Poltergeist: A Classic Study of Destructive Haunting*. Woodbury, MN: Llewellyn Publications.

[NOTES ON A STRANGE WORLD MASSIMO POLIDORO

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Living on Air? The Crazy Ideas and Consequences of Breatharians

Could there be any more extreme beliefs than those held by people who are convinced that the earth is flat or that we live in a computer-generated matrix? Some people are convinced that it is possible to live without eating or drinking—literally claiming to be "existing on air." These "breatharians" claim to be feeding on only light and air in addition to so-called "prana," the supposed vital universal energy (whose existence has never been demonstrated).

For many, the idea of "feeding on light," as they say, is a captivating siren. They claim that it is possible to "reprogram" one's body through meditation techniques so that water and food are no longer needed. Too bad it doesn't work.

A fast can last a few days—a week at most—but after much longer it can be very harmful, leading to death by decay. In the first twenty-four hours, glycogen stocks, the primary source of energy of the cells, are exhausted; to maintain glycemic values in the norm, the body gets the necessary glucose from fats and proteins. However, these soon run out. A fast that also omits water, of course, leads to death much sooner.

About 3,000 people in Europe alone claim to follow this extremely dangerous practice. Fatalities from this practice tend to make the news, though others who practice less restrictive forms may not necessarily come to light and may be more common. Timo Degen, a German kindergarten teacher, learned about breatharianism from a website in 1997. After three weeks of fasting, he went into a coma and died. Then Lina Marcia Roslyn Morris, a fifty-three-year-old Australian, met a couple who convinced her to live on air alone; she died after seven days, and the couple was convicted of her murder. In 1999, a Scottish man named Verity Linn also stumbled across a breatharian website and died from fasting. His body was found two weeks after his death.

Some people are convinced that it is possible to live without eating or drinking—literally claiming to be "existing on air."

Very rarely are those who publicize this type of practice put to any public test. The only documented case dates back to 1999, when Australian program *60 Minutes* followed one of the main proponents of breatharianism, Ellen Grave (better known as Jasmuheen), for a week.

After only one day, she started to show signs of dehydration. Jasmuheen then said she felt "disturbed by pollution." She was moved to a mountainous region, where dehydration worsened; she started to have problems speaking and was losing weight. On the fourth day, the program was interrupted at the request of doctors who feared kidney damage or worse.

How can anyone believe something so absurd? The spokespersons of the movement, such as Jasmuheen, actually lie. They feed in secret or drink juices or eat chocolate, vegetarian food, or fruit and are convinced that there is nothing wrong with that. They justify themselves by thinking that some exceptions to the regimen are harmless—more for fun than for necessity. In reality, if they stop making such exceptions, they would die within a few days, like everybody else.

The news media often make things worse. In Italy, for example, a TV show titled *Openspace* was perhaps the first to give visibility to this practice in 2015. The Turin edition of *Corriere della Sera* online, published April 11, 2018, reported on two Turin women who claimed to feed on nothing but "energy." This was in fact a hoax. Overwhelmed by the controversy, the newspaper immediately withdrew the article out of fear that it could be taken seriously by gullible people.

It is precisely those who experience psychological or emotional fragility who can easily fall prey to those promising simple solutions to minor or nonexistent health problems (such as unneeded "detoxing" or "reprogramming"). This happened with another resident of Turin, a sixty-two-year-old French pensioner, Alain René Francois Fourrè, who, convinced that he could live for weeks without eating, died of malnutrition. ■

[REALITY IS THE BEST MEDICINE HARRIET HALL

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Smart Pills? Beware the PIED Piper

It sounds like the script of a science fiction/fantasy movie: The class dunce takes a pill and suddenly becomes smarter than everyone in the class, including the teacher. An elderly Alzheimer's patient takes a pill and his memory is instantly restored—Alzheimer's dementia cured! Don't you wish? If only that sort of story could be true! Unfortunately, reality intrudes. There are no pills that have such dramatic effects. At best, some drugs (including amphetamines, Ritalin, and caffeine) might modestly improve a student's ability to stay awake and maintain concentration when studying for a test.

It's probably a good thing that there are no miracle smart pills. If a pill could really do such wonderful things, it would create some tough ethical dilemmas. If individuals could gain advantage from a pill, who will get that pill? What if it costs too much for most people to afford? Would you want to live in a world where any person could gain an unfair advantage over another by taking a pill? Especially if there were no way to know ahead of time whether you would be one of the disadvantaged or the privileged? Life is already unfair enough. I think I'd rather take my chances with the brain I was born with.

Unfortunately, there are people who will believe anything they wish were true; they have enthusiastically followed the PIED Piper. The acronym PIED stands for performance and image enhancing drugs. These can include drugs such as steroids, human growth hormone, and diuretics intended to improve appearance or athletic performance. These drugs can be dangerous. They are often abused,[1] and many products are contaminated.[2] A large part of PIED advertising is for dietary supplements that are claimed to improve memory and cognition; these are also known as smart drugs, cognitive enhancers, or nootropics. When Dr. Steven Novella reviewed these drugs, he concluded that nootropics and PIED are being abused and hyped without adequate evidence.[3]

Life is already unfair enough. I think I'd rather take my chances with the brain I was born with.

Some TV commercials are cringe-worthy. I shudder every time they run the commercial for Prevagen that says it's the "number one pharmacist recommended memory support brand." If pharmacists really are recommending it, they shouldn't be—because it doesn't work. In fact, the Federal Trade Commission (FTC) and the New York Attorney General are suing the marketers for false and unsubstantiated claims that it improves memory, provides cognitive benefits, and is "clinically shown" to work. The complaint alleges that the manufacturers relied on a study that failed to show Prevagen works better than a placebo on any measure of cognitive function. They preyed on the fears of vulnerable older consumers experiencing age-related memory loss, and they charged exorbitant prices. The New York Attorney General called it "a clear-cut fraud" that "costs more than a week's groceries but provides none of the health benefits that it claims."[4]

The Aging Population

The number of Americans over sixty-five is projected to nearly double from 52 million in 2018 to 95 million in 2060, when they will make up nearly a quarter of the population. There are measurable changes in cognitive ability and memory functions as we age. Most of us old folks are aware that we aren't able to think or remember things as fast or as accurately as we once did, and we are deathly afraid of descending into Alzheimer's or other forms of dementia. Wouldn't it be great if we could take a pill that would restore our memory and our mental sharpness?

Dr. Steven Novella concluded nootropics and PIED are being abused and hyped without adequate evidence.

To be clear: there are prescription drugs proven to improve cognitive function in patients diagnosed with specific diseases. In 2016, the American Medical Association adopted a new policy discouraging the use of prescription drugs for cognitive enhancement in healthy individuals.[5] They pointed out that drugs approved to treat attention-deficit hyperactivity disorder (ADHD) and narcolepsy were being used off-label by students and others seeking to boost memory or learning, and such use is associated with a variety of adverse effects. In one study, 11.3 percent of college students admitted to taking prescription stimulants that had been prescribed for other people. Amphetamines, dextroamphetamine (Adderall), and methylphenidate (Ritalin) were the most commonly used, and students took them mainly to enhance alertness and to improve academic performance. Students are more likely to use coffee and energy drinks than stimulant pills. Prescription stimulants do not make people smarter. The effects are "highly variable among individuals, are dose-dependent, and limited or modest at best in healthy individuals."

Prevagen's Scientific Claims Refuted

Dr. Joe Schwarcz, chemistry professor and science communicator extraordinaire, has examined Prevagen's claims and handily refuted them.[6] The supposed active ingredient is a jellyfish protein called apoaequorin. It binds to calcium, which plays a crucial role in brain function. But it has to be just the right amount of calcium; high levels of unbound calcium can wreak havoc with nerve cells, impairing thought and memory, not enhancing it. Effects that have been documented in the lab in cell cultures are irrelevant to human health, because the protein is broken down by digestion and never gets into brain cells. The manufacturer of Prevagen hypes a single in-house placebo-controlled trial that allegedly showed memory improvement after ninety days. Although there were some positive results in a few specific tests, overall the placebo group performed as well as the experimental group. Apart from this questionable trial, there are no peer-reviewed studies attesting to the safety and efficacy of Prevagen. Schwarcz points out another kicker: "The company's 'evidence of safety' basically admits that the product cannot work." It admits that the protein is broken down by pepsin in the stomach and *has no chance of getting to the brain.*

As if that weren't enough, the Federal Drug Administration (FDA) has also charged that Prevagen does not qualify for marketing as a natural dietary supplement, because apoaequorin is synthetically produced. The manufacturer also failed to disclose over a thousand reported adverse reactions to Prevagen, including seizures, strokes, fainting, and even memory impairment and confusion—the very symptoms that Prevagen is supposed to treat! Dissatisfied consumers have filed a class-action lawsuit.[7]

Do those pharmacists who are recommending Prevagen know all this? They should. And they should know it is unethical to recommend it. But then, pharmacies carry homeopathic remedies on their shelves alongside real medicines (see the Center for Inquiry's recent legal actions against CVS and Walmart pharmacies for doing so), so what could we expect? It seems you can't trust the average pharmacist to be scientifically accurate and ethical.

Similar Products

There are many other dietary supplement products with similar claims. One of them, Procera AVH (the "Memory Pill Does for the Brain What Prescription Glasses Do for the Eyes") makes claims such as:

- Helps restore up to fifteen years of lost memory power in as little as thirty days;
- Revitalizes tired, sluggish brain cells with a fresh supply of oxygen and key vital nutrients;
- Is clinically shown to quickly help improve memory, focus, concentration, and mental energy.

Those are all lies. I looked for the published evidence and found that it absolutely did not support those

claims.[8] There was a single study of the product. It measured all kinds of factors but only found improvement in three of them (working memory accuracy, long-term memory consolidation, and one measure of mood). The magnitude of those effects was small and probably not clinically significant, and the study is suspect because it was commissioned by the manufacturer and reported by them as showing effects that it did not show.

Prescription stimulants do not make people smarter. The effects are "limited or modest at best in healthy individuals."

Procera AVH is a mixture of three ingredients, and the evidence for each of them is thin gruel indeed. For Vinpocetine, there was a small preliminary study of twelve healthy volunteers whose memory apparently improved. For Huperzine A, there was one small study of students in China, and a Cochrane review found inadequate evidence of effectiveness for dementia. For Acetyl-L-Carnitine, the only studies were in Alzheimer's patients, and the evidence was not objective.

Evidence for Some Products

Piracetam is a popular nootropic, but a Cochrane systematic review concluded that while further research is indicated, the evidence is currently insufficient to recommend it for clinical use. Modafinil is a prescription drug for narcolepsy and other neurologic diseases that is sometimes abused by students. When used by healthy subjects, their responses were slower and were not more accurate. Many combination products include a stimulant such as caffeine, which is probably responsible for any positive effects observed. The effects of stimulants are problematic. They may make users feel more alert but not actually improve performance; in fact, they sometimes decrease performance—and regular users quickly develop tolerance.

Prevention without pills

ConsumerLab has evaluated the evidence[9] for supplements sold to enhance cognitive function and memory. They list a few supplements that may provide modest benefits in some people. They say, "Although green tea has been touted for improving brain function, this effect is not well established. Other supplements touted for brain function, such as *Gingko biloba* and vitamin E have, by and large, not been found to be helpful." While most reviewers agree that the hype for nootropics greatly exceeds the evidence, there are some non-pill measures people can take to help maintain cognitive health:

- Be physically active.
- Manage cardiovascular risk factors such as high blood pressure, diabetes, and smoking.
- Consider possible adverse effects of certain medications.
- Be socially and intellectually active.
- Get enough sleep.
- Avoid alcohol and recreational drugs.

The story of the Pied Piper of Hamelin is a cautionary tale dating back to the thirteenth century. He was a rat catcher hired by the mayor to eliminate a plague of rats. He lured them out of town with his magical music and piped them into the Weser River, where they died by drowning. Then, when the mayor reneged on his promise to pay, the rat catcher took a chilling revenge: he lured all the town's children out of town. In some versions, he returned them after he was paid a ransom far larger than his original price; in others, the children vanished mysteriously, never to return (see Massimo Polidoro's column "The Legend of the Pied Piper" in our January/February 2008 issue).

There are many parallels with the Nootropic PIED Piper. They both involve rats, in this case of the human variety. Characters behave unscrupulously. Promises are made and not kept. The piper plays a siren song that entices everyone who hears it. Rats and people follow it willingly and don't ask questions. There are allegedly miraculous effects. The modern PIED Piper won't lure your children away, but it will lure your money away with false promises.

Apart from a questionable trial, there are no peer-reviewed studies attesting to the safety and efficacy of Prevagen.

Beware the PIED Piper. For that matter, beware any dietary supplement or advertising claim unless you can verify the evidence behind the claims. You can't believe everything you read. ■

Notes

1. https://www.dualdiagnosis.org/smart-drugs-nootropics-the-next-drugs-of-abuse/
2. https://www.ncbi.nlm.nih.gov/pubmed/20355187
3. https://sciencebasedmedicine.org/the-pied-piper-of-nootropics/
4. https://www.ftc.gov/news-events/press-releases/2017/01/ftc-new-york-state-charge-marketers-prevagen-making-deceptive
5. https://www.ama-assn.org/press-center/press-releases/ama-confronts-rise-nootropics
6. https://mcgill.ca/oss/article/health/prevagen-mental-clarity
7. https://www.biospace.com/article/releases/if-you-bought-prevagen-to-improve-your-brain-health-and-memory-a-class-action-may-affect-your-rights/
8. https://sciencebasedmedicine.org/procera-avh-a-pill-to-restore-memory/
9. https://www.consumerlab.com/answers/do-any-supplements-help-with-brain-function/supplements_for_memory/

[BEHAVIOR & BELIEF STUART VYSE

Stuart Vyse is a psychologist and author of *Believing in Magic: The Psychology of Superstition*, which won the William James Book Award of the American Psychological Association. He is a fellow of the Committee for Skeptical Inquiry.

Skepticism Blooms in Brazil

Brazil is considered a developing country with substantial levels of poverty, yet São Paulo, the largest city in South America, is a sophisticated modern metropolis and home to the largest university on the continent. Because citizens are guaranteed healthcare as a constitutional right, Brazil operates the largest national healthcare system in the world, and Brazilian mothers receive four months of paid maternity leave. As a result, although Brazil faces many daunting social and economic challenges, Brazilians can be proud of much more than just soccer and samba.

When it comes to knowledge and acceptance of science, the message is similarly mixed. For example, according to a recent national survey (see Figure 1), Brazilians have a very high regard for the importance of vaccination, and fully 87 percent believe that global warming is caused by humans and produces severe effects. But other areas are more concerning. For example, 83 percent of Brazilians believe that alternative medicine methods are a "good option to treat disease"; 73 percent believe genetically modified organisms are harmful; and 66 percent believe spiritual energy can heal. Although it is less of an issue from a policy point of view, 31 percent believe aliens have visited ancient civilizations on earth.

When it comes to knowledge and acceptance of science, the message in Brazil is mixed.

Homeopathy is a particularly urgent concern because it is offered by doctors through the national healthcare system. To make matters worse, medical ethics rules in Brazil make it very difficult for one physician to publicly criticize another one without potentially losing their license. Norms of "professional courtesy" may be construed as impeding the criticism of another doctor's legally recognized specialty—even if that specialty is homeopathy. As a result,

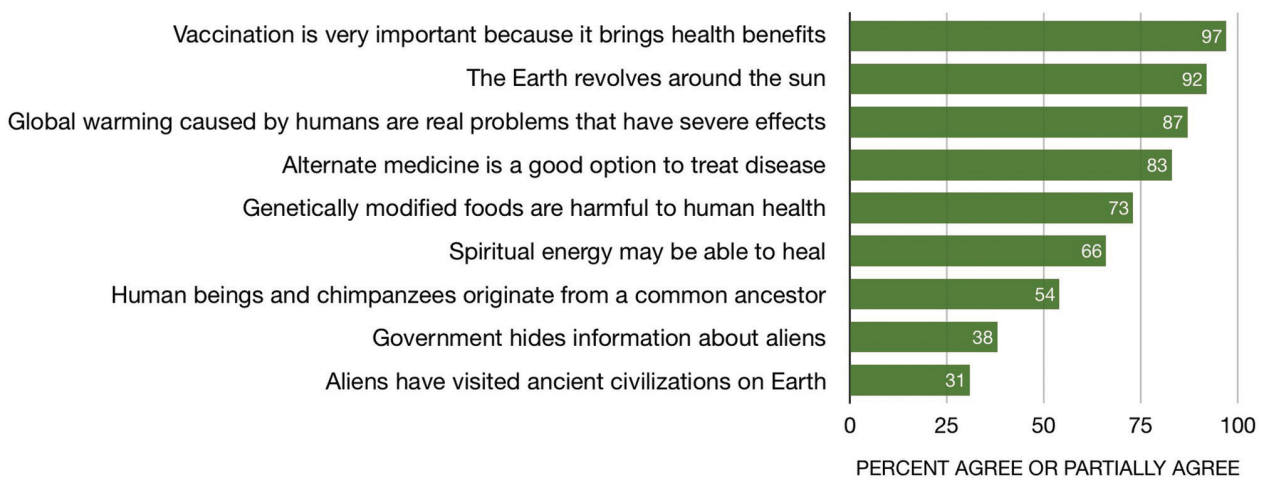


Figure 1: Brazilians' beliefs about science and pseudoscience. (Data based on a 2019 survey conducted by DataFolha [Orsi 2019].)

many doctors in the national healthcare system prescribe homeopathic medicines free of any pushback from fellow physicians who support evidence-based methods. Fully twenty-nine unsupported alternative medicine techniques are allowed and paid for by the national healthcare system. To make matters worse, government science funding in Brazil has been cut in half in recent years (Mega 2019).

But all is not lost. Recently a vigorous group of Brazilian scientists and science communicators formed an organization aimed at bringing the light of science and reason to bear on the kinds of pseudoscience and superstition found in their part of the world. On November 22, 2018, the Instituto Questão de Ciência (IQC; Question of Science Institute; https://iqc.org.br/) launched in São Paulo, and in less than a year they have conducted a dizzying schedule of activities, started the journal *Revista Questão de Ciência*, and established a formidable response to all manner of Brazilian pseudoscience.

Natalia Pasternak, president of Instituto Questão de Ciência.

The Question of Science Institute is led by its president, Natalia Taschen Pasternak, a research fellow at the Institute of Biological Sciences at the University of São Paulo (USP) and one of the most energetic people I have ever met. Prior to starting IQC, in 2015 Pasternak cofounded the Brazilian version of the Pint of Science (http://pintofscience.com.br/), and by 2019, eighty-nine Brazilian cities were participating (Tuffani 2019). She has established many connections with journalists in Brazil and does frequent public events, speaking on behalf of science in discussions of homeopathy and other unfounded beliefs. The other members of the board of directors of IQC are:

- Carlos Orsi (communications director), a prolific science journalist and author who edits and writes for the organization's journal, *Revista Questão de Ciência*.
- Marcelo T. Yamashita (science director), a physicist and director of the Institute for Theoretical Physics at São Paulo State University.
- Paulo Almeida (chief financial officer), lawyer, psychologist, and Public Administration PhD student.

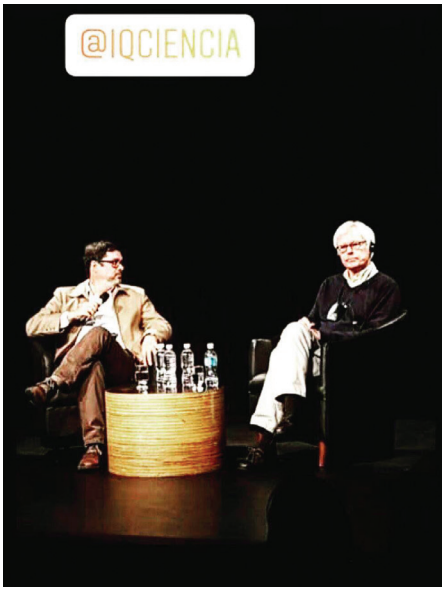
Homeopathy is a particularly urgent concern in Brazil because it is offered by doctors through the national healthcare system.

In addition to this core group, IQC has an eleven-member advisory committee with representation from medicine, physics, chemistry, biology, and philosophy and has many active members. Finally, IQC is represented on all the most important social media platforms, including Twitter (@iqciencia; 1,700 followers), Instagram (@iqciencia; 7,000 followers), and Facebook (www.facebook.com/iqciencia/; 18,000 followers). In less than a year, their content has garnered over five million views.

Throughout their first year, the IQC has maintained a rigorous schedule of events. For their launch in 2018, IQC invited renowned expert on homeopathy and alternative medicine Edzard Ernst to give a public lecture, but that was just the beginning. Some of their events have included:

- November 22, 2018: The IQC launch event, featuring a talk by Edzard Ernst.
- July 25, 2019: Pasternak and Orsi were interviewed for an article titled "Why Homeopathy Is Placebo—and It Should Not Be Paid by the SUS," in *Superinteressante Magazine* (Rossini and Vaiano 2019).
- August 8–9, 2019: Stuart Vyse gave a series of talks sponsored by the IQC.
- September 9, 2019: Pasternak and Orsi gave an address titled "Educational Dialogue: Media, Science and Scientific Dissemination" at the annual meeting of the Federation of Experimental Biology Societies.
- September 12, 2019: IQC and Instituto de Estudos Avançados (Advanced Studies Institute) of the University of São Paulo cosponsored a lecture by USP psychology professor Marco Antonio Varella titled "What Does Ignorance Have to Teach Us?" This was another event in the "Epistemology of Ignorance" series.
- September 20, 2019: Pasternak gave a talk at New York University as part of a symposium called "Inspired Science." The meeting was aimed at expanding the international community of science communicators.
- October 20, 2019: Pasternak spoke at the Center for Inquiry's CSICon conference in Las Vegas, Nevada, and Orsi also participated.
- November 23, 2019: IQC celebrated its first anniversary with the International Seminar of the Question of Science Institute, which consisted of a full day of events, including talks by Michael Marshall, project director of the Good Thinking Society (United Kingdom), and Loretta Maron, CEO and cofounder of Friends of Science in Medicine (Australia).

In August 2019, I was honored to be invited by IQC to give a series of talks in São Paulo. Before I arrived, IQC published Portuguese translations of a few of my Skeptical Inquirer articles on the institute's website, and drawing upon her many contacts with science journalists, Pasternak had arranged for me to do several interviews the first day I arrived. These resulted in articles in several newspapers, including *Scientific American Brazil* and *Folha de S. Paulo*, the largest newspaper in São Paulo.



The question and answer period of a talk by the author in the auditorium of a downtown São Paulo bookstore. Carlos Orsi (left), the communications director of IQC, served as emcee.

In less than a year, the skeptical organization has established a formidable response to all manner of Brazilian pseudoscience.

On my second day in Brazil, I visited the University of São Paulo, to give the first in a series of lectures on the topic "The Epistemology of Ignorance," cosponsored by IQC and the university's Institute of Advanced Studies. My talk was titled "Why People Believe What They Believe" and was attended by scientists and scholars from a wide range of disciplines.

I came away from the experience incredibly impressed with what Pasternak and her band of science advocates have established in such a short time.

On my third day, I returned to USP to give a three-hour workshop for psychology graduate students and faculty on the relationship between science and clinical psychology. My lecture covered some of the material I have reported in this column on the use of the discredited therapy facilitated communication (e.g., Vyse 2018).

Finally, on a Saturday morning I gave a public talk on the psychology of superstition in an auditorium inside a large bookstore in downtown São Paulo. This event was entirely organized by the IQC, who arranged for simultaneous translation for anyone whose English was not adequate to understand me. During the question and answer session that followed, I heard a second translator in my headset, turning the questions that had been submitted by the audience in Portuguese into English that I could understand. It was a wonderful event attended by a large crowd.

I came away from the experience incredibly impressed with what Pasternak and her band of science advocates have established in such a short time. In addition to the public events they have created or participated in, IQC produces a remarkable stream of written material through their online magazine and website. Many of these articles are written by Carlos Orsi, but IQC also recirculates useful science-based publications from other sources. Of course, all this content is widely disseminated through social media to maximize its impact. Finally, although IQC is based in Brazil, Pasternak has made numerous connections with skeptics all over the world, including Barry Karr and Susan Gerbic of the Center for Inquiry.

Brazil is a very large country that poses many challenges for those who champion science and reason, but if it is possible to make a difference, I am confident the intrepid Natalia Pasternak, the brilliant Carlos Orsi, and the other members of IQC's band of science advocates are the ones who can do it. Whenever skepticism blooms it is a joy to see, but the emergence of IQC in Brazil is a particularly exciting development. *Viva a ciência e a razão no Brasil!* ■

References

Mega, Emiliano Rodríguez. 2019. Funding crisis at Brazilian science agency could leave 80,000 researchers and students without pay. *Science* (August 19). Available online at https://www.sciencemag.org/news/2019/08/funding-crisis-brazilian-science-agency-could-leave-80000-researchers-and-students.

Orsi, Carlos. 2019. Survey: Beliefs in science and pseudoscience in Brazil. *Revista Questão de Ciência* (May 23). Available online at http://revistaquestaodeciencia.com.br/english/2019/05/23/survey-beliefs-science--and-pseudoscience-brazil.

Rossini, Maria Clara, and Bruno Vaiano. 2019. Entrevista: Por Que Homeopatia é Placebo – e Não Deve Ser Paga Pelo SUS. Superinteressante (July 25). Available online at https://super.abril.com.br/ciencia/entrevista-por-que-homeopatia-e-placebo-e-nao-deve-ser-paga-pelo-sus/.

Tuffani, Maurício. 2019. Pint of science Abre Inscrições Para Participação De Novas Cidades Em 2020. Direto da Ciência (August 12). Available online at http://www.diretodaciencia.com/2019/08/12/pint-of-science-abre-inscricoes-para-participacao-de-novas-cidades-em-2020/.

Vyse, Stuart. 2018. Autism wars: Science strikes back. Skeptical Inquirer 42(6): 25–27.

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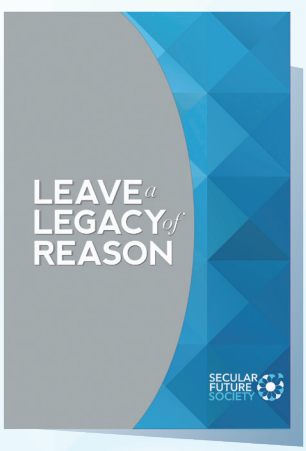

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Matthew C. Nisbet is professor of communication, public policy, and urban affairs at Northeastern University and past editor-in-chief of the journal *Environmental Communication*. His 2018 three-volume series *The Oxford Encyclopedia of Climate Change Communication* was a PROSE award finalist from the Association of American Publishers. Nisbet writes regularly at his blog www.wealthofideas.org. Follow him on Twitter @MCNisbet.

Against Climate Change Tribalism:
We Gamble with the Future by Dehumanizing Our Opponents

This column is adapted from a speech delivered at the 2019 American Climate Leadership Summit held in Washington, D.C., May 1–2, 2019.

Robbers Cave State Park in Oklahoma may be best known today for its picturesque lakes and trails, but for three weeks in 1954 the park was also the setting for one of the most famous experiments in social psychology. In the Robbers Cave experiment, Muzafer Sherif (1988) and his colleagues at the University of Oklahoma recruited twenty-two boys, all fifth graders from similar social backgrounds, to attend what they billed as a specially designed summer camp.

The boys were immediately split into two groups: the Eagles and the Rattlers. For the first week, the teams were kept on separate ends of the camp while they participated in a variety of bonding activities. The boys didn't find out about the other team's existence until the start of the second week. Having never met each other, the boys quickly began to refer to the other team as "outsiders" and "intruders."

Following a series of competitive games, the boys' rivalry grew more intense. They started hurling insults, calling each other "pigs," "sissies," and "cheaters." Their perception of reality shifted. When researchers asked the Eagles and Rattlers to gather up beans from the ground and compare photos of how many each group collected, the boys bragged that their team outmatched the other. In reality, the photos showed the same number of beans for each group. Fueled by competition and social isolation, the teams raided their rival's cabins late at night. The Eagles burned the Rattlers flag; some boys started collecting rocks to throw at the others. Worried about physical injury, the experimenters called off the competitions.

More than sixty years later, the Robbers Cave study stands as a metaphor for today's hyperpartisan politics.

More than sixty years later, the Robbers Cave study stands as a metaphor for today's hyperpartisan politics. Seemingly every policy debate is a competition between two intensely hostile teams. Those on the right and left oppose compromise by their political leaders, view the other party as extreme and uncivil, and believe that their side should benefit the most from any decision.

A recent study by Nathan P. Kalmoe and Lilliana Mason (2019), political scientists at Louisiana State University and University of Maryland, found that more than 40 percent of Americans surveyed viewed the opposing party as "downright evil." Incredibly, 20 percent of Democrats and 16 percent of Republicans said they believed on occasion that the country would be better off if large numbers of the opposition died. In other extreme examples, party loyalists dehumanized their political adversaries. In the case of both parties, nearly one out of five survey respondents agreed with the statement that their political opponents "lack the traits to be considered fully human—they behave like animals." According to their study, if the opposing party won the 2020 election, 18 percent of Democrats and 14 percent of Republicans reported they believed violence would be justified.

The best-educated and informed partisans tend to be the most intensely tribal, engaging in "my side" reasoning that prioritizes victory over a desire for

the greater good (Haidt 2012). Research shows that the most well-informed partisans are quick to endorse their party's policy positions—not as a matter of principle but, as *New York Times* columnist Thomas Edsall (2019) writes, "as a public act designed to signal their tribal loyalty as a Democrat or Republican." On no other issue are such animosities, prejudices, and biases more prevalent—and more problematic—than on climate change.

Finding Comfort in Tribalism

For those of us who advocate for action to address climate change, we are often told to be more like how we perceive our political opponents: more ruthless, more cunning, more aggressive, more willing to bend facts to our side, and more committed to the most audacious and ambitious policies regardless of their flaws. We are all too quick to rally around the banner of those voices that emphasize "us versus them," "good versus bad," and "winning versus losing."

We view those opposed to action on climate change as extreme but seldom apply the same label to those on our side. Green New Deal advocates, for example, have framed the choice for Americans in starkly binary terms: Either join us in a utopian quest to transform the United States into a social democracy or face the catastrophic consequences of a dystopian climate future. There are no other choices. Their battle is equally against moderates and pragmatists as it is against conservatives (Nisbet 2019b).

As a community of advocates, we have become obsessed with the psychology and communication strategies of conservative "deniers," with many scholars striving to expose the faults in conservative psychology, the duplicitous nature of fossil fuel companies, and the many ways in which Fox News and right-wing think tanks seed "denial" and engage in a "war on science." This research has in turn infected mainstream journalism and commentary, in which readers at outlets such as *The Guardian* and *The Washington Post* are consistently left with the impression that "anti-science," "denier" Republicans may in fact be cognitively incapable of reason or compromise on behalf of clean energy policy, similar in nature to Holocaust deniers (Nisbet 2018).

Only seven years ago scholars were actually debating the wisdom of calling those who oppose action on climate change "deniers." Geographers Saffron O'Neill and Max Boykoff (2010) in a letter to the *Proceedings of the National Academies of Sciences* (PNAS) raised concerns about an earlier study at the journal that had divided experts into "convinced" and "unconvinced" camps, interchangeably using the terms *deniers*, *skeptics*, and *contrarians* to refer to the unconvinced. "Continued indiscriminate use of the terms will further polarize views on climate change," warned O'Neill and Boykoff, "reduce media coverage to tit-for-tat finger-pointing, and do little to advance the unsteady relationship among climate science, society, and policy."

The best-educated and informed partisans tend to be the most intensely tribal, engaging in "my side" reasoning that prioritizes victory over a desire for the greater good.

Their warnings, however, had little impact on the direction of scholarship, strategy, or journalistic coverage. Today's ubiquitous branding of Republicans as the party of "denial" greatly exaggerates the intensity of opposition to climate and clean energy solutions among those on the center-right, creating a self-reinforcing spiral of false perceptions. For the past few years, polling has consistently shown that majorities of registered voters, including Independents and moderate Republicans, believe that global warming is mostly caused by human activities and say that they support climate regulations and clean energy policies. Beyond this general voter sentiment, according to the Yale Climate Opinion Maps project, most adults in every Congressional district across the country say they support fossil fuel companies paying a carbon tax, regulating CO_2 as a pollutant, and setting strict restrictions on emissions from coal power plants (Nisbet 2019a).

But research also indicates that many Republicans who privately support solutions to climate change refrain from publicly doing so out of an exaggerated fear of retaliation from their peers, a fear that has been magnified by efforts among some scholars and journalists to socially stigmatize the supposedly mass number of deniers among their ranks (Van Boven et al. 2018).

The more we become angry and the more we catastrophize about the future, the less likely we are to find common ground or even be able to treat our political opponents as human beings. And social media is only making everything worse. Playing to the most basic elements of human nature, social media has done great damage to the climate change movement, destroying our ability to think collectively and discuss productively across lines of difference. Artificial intelligence-driven platforms serve up a constant stream of news and commentary that reflects our existing biases and beliefs rather than content that might challenge them.

Those specializing in the dark arts of social media "engagement" have used these platforms to hack our brains, training our focus on conservatives and the evildoings of the fossil fuel industry while the end times loom. Because it kidnaps our attention, the most inflammatory, most outrageous, and most catastrophic content is rewarded by social media algorithms, ensuring that it travels the furthest. Because social media is a place where we find comfort in our tribal identity, posting, liking, and spreading ideologically affirming content generates social value, regardless of the source, quality, or veracity of the content we may be sharing (Vaidhyanathan 2018).

When claims are challenged, such

as the viability of a 100 percent path to renewables or the political feasibility of the Green New Deal, climate advocates often respond by digging in their heels and attacking the critic, further demonstrating their loyalty. In doing so, they follow the lead of a climate blogger or "Twitter celebrity," who through their commentary make it easy for us to remain loyal to ideas or policies that have come to symbolize what it means to be a "climate hawk" or activist.

Engaging in More Thoughtful Conversations

"Moderation is not an ideology; it is a way of being. It stands for humility of the head and ardor in the heart," writes *New York Times* columnist David Brooks (2019). "When you listen to your neighbor, you see how many perspectives there are and you're intellectually humble in the face of that pluralism. When you listen to your neighbor, you see that deep down we're the same and you hunger to deepen that connection."

There can be no progress on climate change until we rebuild our civic capacity to discuss, debate, and disagree in ways that do not turn every aspect of climate politics into an identity-driven tribal war between good and evil. We must harness our organizational resources and personal gifts to serve not as partisan persuaders but as partners in face-to-face dialogue with other Americans and decision-makers, embracing our common humanity.

But to embrace our common humanity, we must adopt and encourage the practice of what Georgetown University's Cal Newport (2019) calls "digital minimalism," a philosophy that helps you question what digital communication tools (and behaviors surrounding these tools) add the most value to your life. It is impossible to resist the siren song of climate tribalism if, like the average American, you spend several hours a day on your smartphone swiping, scrolling, skimming, liking, hearting, retweeting, forwarding, and responding to other people's thoughts, especially if they apply to climate change politics.

When a new Intergovernmental Panel on Climate Change report is released or the proposed Green New Deal is announced, your first thought in today's news feed culture of righteousness is not your own original idea but almost inevitably someone else's appealing to your worse biases. Spending less time on social media and your smartphone will free up mental energy for contemplation and deep reading of a diversity of high-quality sources, alone with your thoughts, wrestling with uncertainties and complexities, scrutinizing your assumptions and beliefs.

On no other issue are such animosities, prejudices, and biases more prevalent—and more problematic—than on climate change.

Minimizing social media usage will also enable you to be more present and less judgmental during face-to-face discussions. The initial focus of a conversation about a contentious topic such as climate change with a neighbor, community member, or elected official should be to simply recognize and affirm shared identities, ideals, and beliefs. Reframing climate change in terms of public health or religious duty, for example, may help foster a more thoughtful conversation (Nisbet 2018).

Still, there are no magic messages capable of overcoming false beliefs or converting someone to your side. Yet with trust and relationships established, further dialogue can focus on working together toward common goals related to energy decarbonization and societal resilience. If common goals on a specific topic may not exist, investing in more thoughtful conversations and the forums to engage in those conversations can at least help reestablish the norms of civility that have been lost in our society, enabling climate change advocates and those we disagree with to come to respect the nature and reasons for our differences. ■

References

Brooks, D. 2019. An agenda for moderates: The policy implications of love your neighbor. *New York Times* (February 26). Available online at https://www.nytimes.com/2019/02/25/opinion/moderate-politics.html.

Edsall, T. 2019. No hate left behind: Lethal partisanship is taking us into dangerous territory. *New York Times* (March 13). Available online at https://www.nytimes.com/2019/03/13/opinion/hate-politics.html.

Haidt, J. 2012. *The Righteous Mind: Why Good People Are Divided by Politics and Religion*. New York: Vintage Books.

Kalmoe, N., and L. Mason. 2019. *Lethal Mass Partisanship: Prevalence, Correlates, and Electoral Contingencies*. Paper presented at the National Capital Area Political Science Association, Washington, D.C. Available online at https://www.dannyhayes.org/uploads/6/9/8/5/69858539/kalmoe___mason_ncapsa_2019_-_lethal_partisanship_-_final_lmedit.pdf.

Newport, C. 2019. *Digital Minimalism: Choosing a Focused Life in a Noisy World.* New York: Penguin Books.

Nisbet, M.C. 2018a. *Scientists in Civic Life: Facilitating Dialogue-Based Communication*. Washington, D.C: American Association for the Advancement of Science. Available online at https://www.aaas.org/programs/dialogue-science-ethics-and-religion/resources-engaging-scientists-project.

———. 2019a. The battle over public opinion on climate is over. ScientificAmerican.com (February 7). Available online at https://blogs.scientificamerican.com/observations/the-battle-over-public-opinion-on-climate-is-over/.

———. 2019b. Sciences, publics, politics: The green new dilemma. *Issues in Science and Technology* 35(3) (Spring): 29–31. Available online at https://issues.org/the-green-new-dilemma/.

O'Neill, S.J., and M. Boykoff. 2010. Climate denier, skeptic, or contrarian? *Proceedings of the National Academy of Sciences* 107(39): E151–E151.

Sherif, M. 1988. *The Robbers Cave Experiment: Intergroup Conflict and Cooperation.* Middletown, CT: Wesleyan University Press.

Vaidhyanathan, S. 2018. *Antisocial Media: How Facebook Disconnects Us and Undermines Democracy.* Oxford University Press.

Van Boven, L., P.J. Ehret, and D.K. Sherman. 2018. Psychological barriers to bipartisan public support for climate policy. *Perspectives on Psychological Science* 13(4): 492–507.

[SKEPTICAL INQUIREE BENJAMIN RADFORD

Benjamin Radford is a research fellow at the Committee for Skeptical Inquiry and author or coauthor of a dozen books, including *Investigating Ghosts: The Scientific Search for Spirits*.

Is America a Sheeple Factory?

Q: **It's said that the best way to keep people down is to limit their access to education and knowledge, making it easier to control them. That seems to be what the government does. What do you think?**

—C. Griffin

A: I was asked this question in mid-2019, accompanied by the news headline "Trump Administration Proposes $7.1 Billion Funding Cut to Education Department." The claim, like most conspiracy theories, has a superficial populist appeal, and I've seen the sentiment echoed by many otherwise skeptical friends and acquaintances.

An unedited sampling of Reddit posters on the topic provides some typical opinions:

- "The govt wants us all dumb, That way we follow what they want us to follow, We're like puppets to them, You got to think for yourself, It's sad to say that's what this world has come to."
- "The goal of keeping the populace dumb starts in schools and a percentage of the older population. This has been going on for a few decades now. They want stress free educational environment which aims to reduce any challenge to the student. Any indoctrination is completely effective on those who are either naive or ignorant compared to those who are much older who know and have learned of the world we live."
- "9/11 official LIE proves how dumbed down the western populace is … most of them still believe the 'staged' moon landings [and] the official story of what happened on 9/11, completely ignoring of how the laws of physics work … now we are left with gullible men-children

who believe ANYTHING they see or hear from media/governments. Common sense died long ago to."

Many conspiracy theorists—from David "Obama Is a Secret Lizard Illuminati" Icke to Alex "Everything Is a False Flag" Jones—have eagerly adopted this idea. It's not surprising, because complaints about suppression of information (and secret knowledge available only to the powerful elite) are key to their worldview. Note that the claim is not merely about *misinformation* (a staple of conspiracy theories) but the active suppression of otherwise ordinary general knowledge and information.

As Joseph Uscinski and Joseph Parent note in their book *American Conspiracy Theories*, "A trope of conspiracy theorists is that those in power are snake charmers, using conspiracy theories to manipulate the masses. Joseph McCarthy and Adolf Hitler come to mind [however] the evidence shows that such snake charmer fears are exaggerated" (Uscinski and Parent 2014, 152).

Many conspiracy theorists—from David "Obama Is a Secret Lizard Illuminati" Icke to Alex "Everything Is a False Flag" Jones—have eagerly adopted this idea.

A History of Anti-Education Complaints

The idea has a long history. In his influential 1869 book *On Liberty*, John Stuart Mill wrote:

> A general State education is a mere contrivance for moulding people to be exactly like one another: and as the mould in which it casts them is that which pleases the predominant power in the government, whether this be a monarch, a priesthood, an aristocracy, or the majority of the existing generation, in proportion as it is efficient and successful, it establishes a despotism over the mind, leading by natural tendency to one over the body.

Another early proponent was professional curmudgeon H.L. Mencken, who wrote in the April 1924 issue of his magazine *The American Mercury*:

> The aim of public education is not to spread enlightenment at all; it is simply to reduce as many individuals as possible to the same safe level, to breed and train a standardized citizenry, to put down dissent and originality. That is its aim in the United States, whatever the pretensions of politicians, pedagogues and other such mountebanks, and that is its aim everywhere else.

For later generations, the Pink Floyd song "Another Brick in the Wall (Part 2)" from the album and film *The Wall* is perhaps a clearer touchstone, tapping into universal student grousing about conformity and mandatory public education.

Complaints about the educational system (or public transportation, crumbling infrastructure, or any other social service) are both timeless and beyond the scope of this column. But it's fair to point out that much has changed in the American educational system since the days of Mill and Mencken (more on that presently). Nevertheless the idea holds a strong sway over many people today.

Like UFO cover-ups (see "The Phantom Menace of UFO Revelation," my July/August 2018 SI column), this conspiracy allegedly spans administrations and generations. Democrat and Republican alike are allegedly participants in this institutional conspiracy. (The effects of Trump's education cuts that spurred this query would not be seen in general education levels for

years—if at all—and thus any "benefit" to keeping the public ignorant would of course boost the goals of future Democratic presidents and administrations as well. If true, it's heartening to see this common ground and shared agenda between otherwise deeply polarized political parties.)

On social media, I've seen this claim shared unironically by many highly educated people, often with a whiff of condescension. Those advocating conspiracies of course exclude themselves as victims of it. They're "in the know" and have managed to break free of the blinders. It's the Others—the ignorant masses of sheeple—who need to wake up and realize how they've been so woefully duped and kept ignorant by the government in service of controlling them.

Where's the Beef?

Falsifying conspiracy theories is a difficult task, but we can look at different lines of evidence for this one. This conspiracy ignores the fact that education and information—the very things that the government is supposedly working to contain and minimize—have never before in human history been so freely available. There are over 115,000 libraries across the United States that have books and current publications on every imaginable topic that are free to read by anyone at any time. Virtually everyone has some access to the internet, a portal to virtually unlimited information via Wikipedia, tutorials on YouTube—and the Khan Academy, a free multilingual online program offering courses on myriad topics—news articles, blogs, and the like. (Some information is of course behind newspaper and journal paywalls, but that's a function of for-profit publication and has nothing to do with government attempts to suppress knowledge.)

Americans are better educated than at any other time in history. In July 2018, the U.S. Census Bureau revealed that 90 percent of Americans twenty-five and older completed at least high school—an all-time high and a remarkable increase from 24 percent in 1940. Education has risen dramatically in the population as a whole, across genders, races, and economic statuses (Schmidt 2018). The Census Bureau also found that the number of people aged twenty-five and over whose highest degree was a master's has doubled since 2000 to 21 million. During that time, the number of people earning doctorate degrees more than doubled to 4.5 million. In 1940, 3.8 percent of women and 5.5 percent of men had completed four years or more of college; by 2018, it was 35.3 percent for women and 34.6 percent for men.

It's fair to point out that much has changed in the American educational system since the days of Mill and Mencken.

The United States spends $706 billion on education, according to the U.S. Department of Education (2019), which comes to about $13,850 per public school student. Not only does the government provide free, mandatory grade school education,[1] but it also offers low-interest student loans for those who wish to pursue higher education. All this is puzzling behavior for a government that wants to keep its citizens ignorant—but perhaps someone didn't get the memo.

The shadowy sheeple factory workers are obviously losing the battle to keep citizens ignorant. The data—assuming you don't think they've been faked—are quite clear. And where, exactly, is the "puppet-like" dumbed-down populace that believes anything the government and media say? The idea that Americans—after decades of their education being systemically suppressed by the government—have become easily swayed and docile is absurd. Americans are hardly in lockstep agreement with what its leaders and officials want; this is especially clear from the widespread and well-attended protest marches across the country in recent years. From the Women's Marches to Occupy Wall Street, from protesting for climate change and education policies to gun control and police brutality, Americans show no sign of being too uneducated about what's going on to embarrass and cause trouble for those in power.

Regardless of status as progressive, conservative, or something else, everyone can unite to complain about the stupidity of their fellow citizens and blame the "gubmint" for trying to keep citizens uninformed. Many people endorse the spirit or gist of conspiracy theories while not necessarily believing in their literal truth. This is especially true of socially and politically charged issues. Sharing on social media is less about the content of that specific story or meme than it is about symbolic endorsement, or what's been called virtue signaling. Liking or sharing a news story doesn't necessarily mean you've read it—much less understand it or can intelligently discuss it—but instead it's often used as a visual badge representing your social views and grievances.

If there really are federal government employees in charge of keeping Americans ignorant—maybe a "black operation" with a name like "Department of Anti-Education" located in some nondescript hallway in the Pentagon—they must surely be disappointed in their demonstrable and utter incompetence. ■

Note

1. If this theory were true, we might expect the country's teachers to resign *en masse* upon realizing that their careers and attempts to educate America's youth are being intentionally, institutionally, and actively undermined by the federal government.

References

Schmidt, Erik. 2018. For the first time, 90 percent completed high school or more. United States Census Bureau (July 31). Available online at https://www.census.gov/library/stories/2018/07/educational-attainment.html.

U.S. Department of Education, National Center for Education Statistics. 2019. *The Condition of Education 2019* (NCES 2019-144), Public School Expenditures. Available online at https://nces.ed.gov/programs/coe/indicator_cmb.asp.

Uscinski, Joseph, and Joseph Parent. 2014. *American Conspiracy Theories.* New York: Oxford University Press.

Skepticism about Cancer Screening: An Interview with Dr. H. Gilbert Welch

FELIPE NOGUEIRA

Dr. H. Gilbert Welch is an American physician and cancer screening researcher. As a former professor at the Dartmouth Institute for Health Policy and Clinical Practice, he has published many peer-reviewed papers about the harms of early detection and specifically of cancer screening—the systematic search for cancer before it causes symptoms.

Welch is also a science writer. His first book, published in 2004, was *Should I Be Tested for Cancer? Maybe Not and Here's Why*. Welch, along with researchers Lisa Schwartz and Steven Woloshin, wrote *Overdiagnosed: Making People Sick in the Pursuit of Health*, which deals with screening and other cases where medicine probably causes more harm than good. His latest book, published in 2015, is titled *Less Medicine, More Health: 7 Assumptions That Drive Too Much Medical Care*.

Welch and I discussed why diagnosing cancer early is not necessarily always a good thing.

Dr. H. Gilbert Welch

When we are discussing problems of screening, how can we make the message clear that not all medical care is being criticized?

I am a conventionally trained physician and believe medical care can do a lot of good—particularly for people who are sick and injured. Making a timely diagnosis in people who are sick is really important. What I am worried about is when medical care expands to the population that is well, because it is hard to make a well person better, but it is not that hard to make them worse.

We might involve a thousand people in a screening program for ten years, and one person is helped. This is good, but an important question is: What happened to the other 999? That is where I have been in my career for the past twenty years.

What is the main idea behind screening and its problems?

In the past, doctors waited for problems to develop in a population and made diagnosis and treatment in that fraction. The idea of screening or early detection is to advance in time the moment of diagnosis in the same population. The assumption behind screening is that the people diagnosed early will be those destined to develop problems.

However, the reality has been different; whenever we look hard for early forms of disease, we find that more people have them. Thus, not all of them will develop problems. Because we do not know who is going to develop problems, we tend to treat all of them. This means we are treating some people for whom the disease would never be a problem. The overdiagnosed and needlessly treated fraction cannot be helped, but they can be harmed.

Overdiagnosis happens to a relatively few individuals. A more common problem of screening is the disease scare—a false positive result. Many individuals require multiple visits and multiple tests before we are sure they don't have cancer. Patients understand that medications can be harmful, but they cannot imagine how a test could be harmful. They think that it is always good to know, but they do not recognize the cascade of events that a test can trigger. Even a perfectly safe test can lead to a series of events that can harm people.

Finally, to promote screening we need to scare people about the disease ("that's why you need to be screened"). In other words, we are making everybody more worried about the future. Ironically, part of being healthy is being not too worried about health. Screening is responsible for injecting some "disease" into the population.

What is the effect of screening/early detection in survival statistics?

With more detection, the typical patient now does better. Among patients with the disease, they appear to have survived longer. This happens because people who are overdiagnosed or have less severe forms of disease are included in the "disease" group. Screening effects are really misleading: the harder you look, the more you find, and everyone appears to be better. It is related to the popularity paradox of screening: the more overdiagnosis screening causes, the more popular screening becomes.

What have we learned about cancer progression and its relationship with screening?

Cancer is much more heterogeneous than we thought. Abnormalities that meet the pathological definition of cancer could have very different natural histories; they have variable growth rates.

It has been described as the barnyard pen of cancers. There are three animals

in the barnyard: the birds, the rabbits, and the turtles. The goal of screening is to fence them in, to catch them early. However, we cannot catch the birds, because they are already gone. Birds are the most aggressive cancers; they have already spread by the time they are detectable. Screening does not help with those cancers. Sometimes we can treat them, but they are the worst type.

It is possible to catch the rabbits if you build enough fences. The rabbits are the cancers that can be detected earlier and will bother patients. So screening may help in these cases. For screening to be of help, treatment needs to be more effective early than it is late. Sometimes this is not true. In the case of breast cancer, for example, a two-centimeter tumor can be treated as well as a one-centimeter tumor.

Finally, we don't need any fences for the turtles, because they are not going anywhere. Turtles meet the pathological definition of cancer. However, they are either not growing or growing so slowly that they will never cause problems until the patient dies from something else. Or they are regressing—some cancers start and they disappear; perhaps they are recognized by a well-functioning immune system.

The unfortunate reality is that screening is very good at finding turtles. Doctors are not able to distinguish turtles from rabbits; thus we treat everybody, creating the major harm of early detection: overdiagnosis and overtreatment.

How has screening affected the incidence of prostate cancer?

Note how the incidence of prostate cancer in the United States bounces around (see Figure 1). There is no known tumor biology or carcinogenic process that can explain this graph. It looks more like a financial chart than a cancer incidence chart. And this is not a small-number problem; it is the most common cancer in the database.

The graph can be divided into four phases. It begins in 1975 with the growth of transurethral resection of the prostate (TURP), which at the time was a common prostate surgery done to help men with large prostates. With more pieces of prostates being sent to pathologists, the incidence of prostate cancer slowly increased. The second phase is PSA promotion, when hospitals started to offer free PSA tests, knowing they would make their money back in subsequent blood tests, biopsies, and treatments. Around 1995, the retrenchment era began with urologists recognizing that they should not offer PSA screening for men with less than ten years of life expectancy, since they cannot be helped by screening. Finally, the discouragement took place after the U.S. Preventive Services Task Force argued against PSA screening. It is remarkable the incidence at present is almost the same as in 1975. In other words, this is a scrutiny-dependent cancer. I do not know of a more powerful example of how the health care system affects the apparent amount of cancer.

Among common cancer screening programs (for cervical, colorectal, breast, and prostate cancers), what are their effects in the mortality of those cancers?

We never had a randomized trial of cervical cancer screening; it was implemented before we considered randomized trials. There is a lot of observational data that suggests it is helpful, but it does not explain the 80 percent reduction in cervical cancer mortality. For instance, we have seen an 80 percent reduction in stomach cancer mortality, and it is a cancer that we do not screen for. Colon cancer mortality is also declining, and the fall started before the introduction of screening.

Screening for cervical cancer and colorectal cancer has had some effect in the mortality of those cancers. Breast cancer screening has had only a little effect on breast cancer mortality. The big effect in breast and prostate cancer is better treatment—we learned those cancers are hormonal diseases.

How do you see the risk-to-benefit ratio of those cancer screening programs?

In general, people consider colorectal

"For screening to be of help, treatment needs to be more effective early than it is late. Sometimes this is not true."

—Dr. H. Gilbert Welch

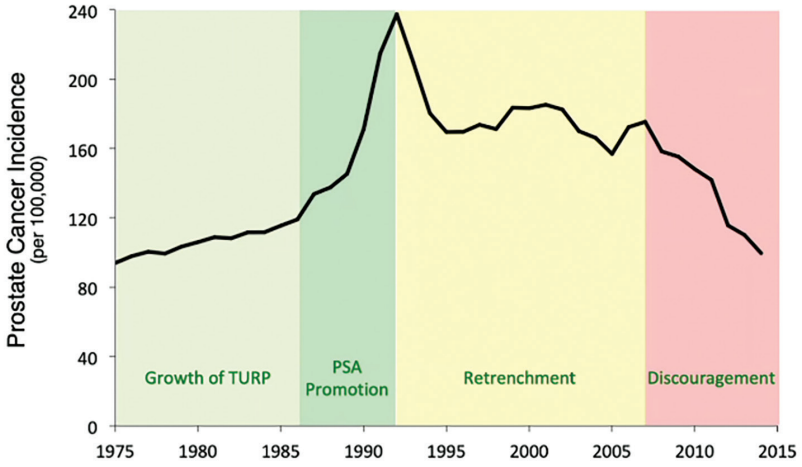

Figure 1. Age-adjusted incidence of prostate cancer in the United States during 1975–2014 (Welch and Brawley 2018).

and cervical cancer screening on the side of more benefit than harm. I think this is largely because the problem of cancer overdiagnosis is less evident in those cases. Because they detected precancerous lesions, overdiagnosis takes place at a prior step, dysplastic polyps or cervical dysplasia. In colorectal cancer screening, there are complications from colonoscopy and from polypectomies (e.g., bleeding, perforations). In cervical cancer screening, there are complications from cryotherapy and excisions for precancerous lesions (e.g., bleeding, preterm birth).

Cancer screening has a mix of effects. Most screening, including PSA and mammography, does help a few people but also harms others. This is the conundrum we must be clear about. So, screening is not a public health imperative; it's a choice.

Screening can distract people from more important things they can be doing for their health. It can also distract resources from other more important interventions. There are two very different aspects to the word *prevention*. One is health promotion from behavior advices, such as do not smoke, eat real food, move regularly, and find meaningful relationships. They are not sexy or technological but are very important to health. But when the prevention movement got medicalized, it became a technological imperative to look for early forms of disease.

We also have to be sensible with the overdiagnosis problem. We have to stop thinking the best test is the one that finds more cancers. Typically, that is how tests are promoted, "This test finds more cancer than that one." That is not a good test; we are not looking to find *more* cancers; we want to find a few cancers that *matter*.

"It is hard to make a well person better, but it is not that hard to make them worse."
—Dr. Welch

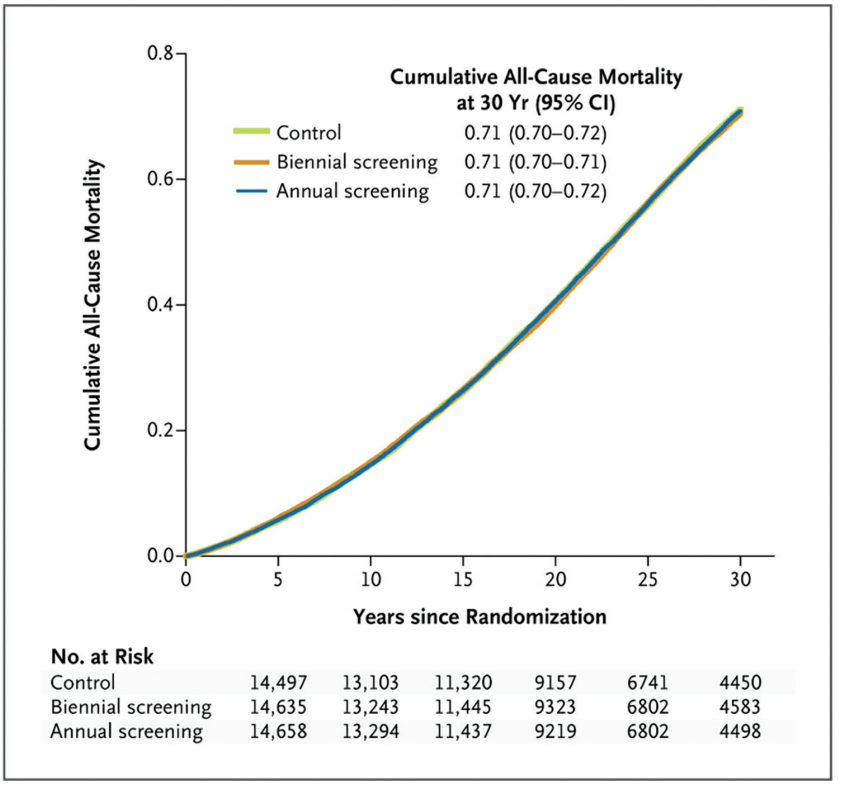

Figure 2. The Minnesota Colon Cancer Control Study: All-cause mortality was the same between three groups: control (non-screened), annual screening, and biennial year (Shaukat et al. 2013).

How can we make screening better, for instance to find those cancers we can make a difference in?

This is best exemplified in the case of lung cancer screening. In the United States, lung cancer is the most common cause of cancer death; it is a big problem. There is a really well-defined risk group, which can be identified by a single question: "Do you smoke?" We have a really common cause of death and an easy way to find a high risk group—it is a perfect situation for screening.

Lung cancer was the first cancer studied for screening, and it happened in the 1980s using chest X-ray. The results were terribly disappointing: screening led to more deaths, not fewer. This happened because screening triggered operations, and some died from those operations. The idea of overdiagnosis in lung cancer was crazy, but it happened. Then, spiral CT comes along. Importantly, the investigators responsible for spiral CT trial knew about overdiagnosis. What they did was groundbreaking. When the spiral CT found a small lesion that looked worrisome, they did not act and did not biopsy immediately; they waited three months to see whether the lesion was growing. They were making use of the diagnostic value of time. Time provides information both about the genetics of the tumor and the body's reaction to it. I think that is a step forward.

Everything changes when you move to a genuine high-risk population (recall that regular cigarette smokers are twenty times more likely than non-smokers to die from lung cancer). They are much less likely to be overdiagnosed and much more likely to be helped. But there are not a lot of risk factors as common and powerful as cigarette smoking. Most cancers are sporadic and not the result of some obvious risk factor.

All-cause mortality is not reduced in population-wide cancer screenings trials. Can you explain why it matters?

It begins with what counts as a cancer death. In the context of evaluating a screening, I want cancer death not only to include deaths from cancer but also deaths due to interventions performed as part of looking for and treating the cancer. That is not what happens. That is why all-cause mortality is important. If we are

going to tell people that screening "save lives," I would like to know if it changes their risk of death. Unless you want to play a game that you care more about one type of death than another.

A good example is the classic Minnesota Colon Cancer Control Study. It now has thirty years of follow-up. There are three arms in the study: annual and biennial screening and control group. After thirty years, 2 percent of the annual group and 3 percent of the control group died from colon cancer. This is the benefit: 1 percentage point, or to put it in relative terms, a 33 percent reduction in colon cancer death. However, all-cause mortality was the same in all groups (Figure 2). It is hard to say that is saving lives; it may be trading one form of death for another.

Because screening benefits are not large and there are harms, what are the reasons for the heavy promotion of screening?

The first is a true belief that early detection must help, as a solution to every bad disease. Money is another part, because screening is a great way to recruit new patients. It is good for Pharma, for test manufacturers, and increasingly good for our hospitals. It is a powerful idea to look for diseases early. If you could argue that everyone should do something, it is a huge market.

What about clinical breast examination and self-breast examination often advertised to women?

The data is clear that clinical breast exam and teaching women to self-examine their breasts does not seem to help. But if a woman becomes aware of a new breast lump, she should have it evaluated. Part of the attention to breast cancer has been good. Ironically, it is possible that screening mammography could be the best way to do the clinical breast exam, if the threshold would be looking for things 1 cm or bigger. I think a lot of harm from mammography could be reduced if the thresholds for further investigation were much higher.

The general conundrum of screening is we have to involve a whole bunch of people to potentially help a very few. We have to pay attention to not disturb the rest of them.

"Most screening, including PSA and mammography, does help a few people but also harms others. This is the conundrum we must be clear about."

—Dr. Welch

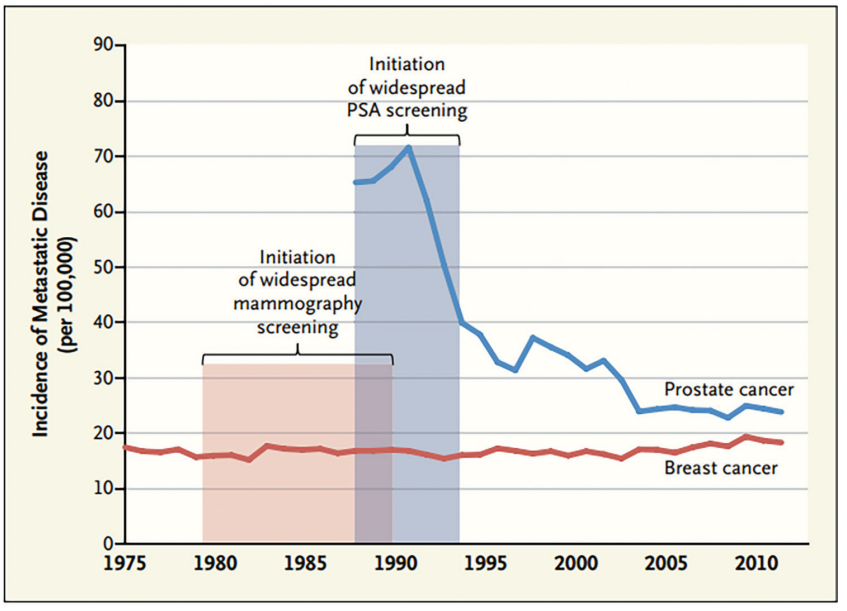

Figure 3. Incidence of cancer that was metastatic at first presentation in the United States, 1975–2012 (Welch et al. 2015).

How do you see the paper that claimed an increase in advanced cases of prostate cancer after USPSTF 2012 recommendation against screening?

That report—an increased number of late stages of prostate cancer—was highly flawed. They were only talking about "counts"; they never had a denominator.

In the U.S. data so far (Figure 3), the incidence of metastatic prostate cancer at first presentation (the cancer was already metastatic at the moment of diagnosis) continues to stay stable. But I expect it will go up.

What you see is the implementation of PSA screening really had an effect on that incidence; it almost cut it in half. This is a sign that the bad cancers are being found early. Now it's been fairly stable, but I wouldn't be surprised if it goes back up, because PSA screening is going down. But whether that changes death rates is a separate question, because early treatment must matter.

Notice, in comparison, the incidence of metastatic breast cancer at first presentation never changes; it is pretty stable. Mammography screening has not been able to reduce the amount of breast cancer diagnosed at this very late stage. That's not the mammographers' fault; that's the fault of the aggressive cancers (the birds in the barnyard analogy).■

References

Shaukat, A., S.J. Mongin, M.S. Geisser, et al. 2013. Long-term mortality after screening for colorectal cancer. *New England Journal of Medicine* 369(12): 1106–14. doi: 10.1056/NEJMoa1300720.

Welch, H.G., and O.W. Brawley. 2018. Scrutiny-dependent cancer and self-fulfilling risk factors. *Annals of Internal Medicine* 168(2): 143–144. doi: 10.7326/M17-2792.

Welch, H.G., D.H. Gorski, and P.C. Albertsen. 2015. Trends in metastatic breast and prostate cancer—lessons in cancer dynamics. *New England Journal of Medicine* 373: 1685–1687. doi: 10.1056/NEJMp1510443.

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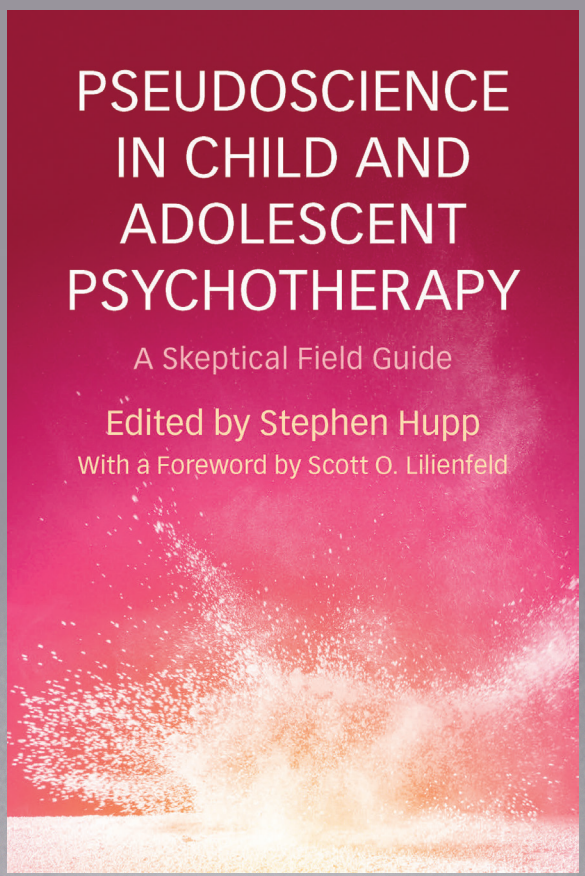

Dubious Claims in Psychotherapy for Youth

Part I:

Neurodevelopmental Issues

Psychotherapy for young people is full of questionable ideas. This article, the first in a three-part series, addresses neurodevelopmental issues, including craniosacral therapy for intellectual disabilities, dolphin-assisted therapy for those on the autism spectrum, brain balancing for inattention, teaching based on learning styles, and dental devices for tics.

STEPHEN HUPP, JASON TRAVERS, LORI MARINO, SCOTT O. LILIENFELD, CHRISTIAN JARRETT, INDRE VISKONTAS, GRANT RITCHEY, CLAY JONES, AND HENRY HUPP[1]

There are hundreds of different types of psychotherapy practices used with children and adolescents. Many have been shown to be ineffective, and some of them even have harmful effects. Still others have never been tested but are based on implausible assumptions.

In the book *Pseudoscience in Child and Adolescent Psychotherapy* (edited by Stephen Hupp, Cambridge University Press, 2019), scholars from psychology and related fields detail some of the most common examples of pseudoscience and dubious claims made related to psychotherapy with youth. Each chapter of the book also includes a sidebar written by skeptics and science communicators, representing a variety of different disciplines.

Most of the sidebars in the book have been pulled together in this three-article series. For this first installment dedicated to neurodevelopmental issues for youth, contributors include three neuroscientists, a behavior analyst, a clinical psychologist, a dentist, a pediatrician, and a high school student. Topics covered in six sections include symptoms related to intellectual disabilities, the autism spectrum, attention-deficit/hyperactivity disorder, specific learning disorder, and tics. Finally, the issue of whether children should be taught about pseudoscience is addressed.

Intellectual and Adaptive Functioning: Does Craniosacral Therapy Improve Cognitive Functioning?

Jason Travers

Intellectual disabilities are very often the product of an individual's genetic endowment or injury to the brain, such as hypoxia during birth or toxic exposure to lead during childhood (Shapiro and Batshaw 2011). Educational methods typically are the most effective means of improving functioning and quality of life. Craniosacral therapy (CST) has been claimed to be a useful alternative medical treatment for treating an array of health problems and disabling conditions, including intellectual disability.

There exists no underlying scientific justification or reliable scientific evidence for craniosacral therapy.

CST is also called craniopathy, cranial osteopathy, cranial therapy, sacro-occipital technique, and bio-cranial therapy. The method typically is used by practitioners with dubious credentials (e.g., chiropractors) but also by seemingly credible individuals such as physical therapists, massage therapists, osteopaths, and dentists. CST is based on the unsubstantiated notion that a craniosacral system is associated with the "primary respiratory mechanism" of cerebrospinal fluid that influences blood flow throughout the body. CST proponents claim they can detect a "craniosacral rhythm" in their clients and that applying pressure to the skull can influence the regulation of cerebrospinal fluid. They further claim that balancing cerebrospinal fluid is critical for good health and brain function, and this is an outcome of their treatment. CST practitioners believe they can use light touch to detect the flow of cerebrospinal fluid and therapeutically manipulate cranial bones. Manipulations are claimed to regulate cerebrospinal fluid, thereby improving cognitive functioning.

There exists no underlying scientific justification or reliable scientific evidence for CST (Hartman and Norton 2002). Several studies have found that CST practitioners are unable to reliably detect the craniosacral rhythm they claim informs their treatment (Hanten et al. 1998; Rogers et al. 1998; Wirth-Pattullo and Hayes 1994). At least two deaths associated with CST have been documented (Barret 2012). CST is not a medical treatment and does not improve intellectual disability. CST has been described as wholly pseudoscientific, and its practice is often characterized as quackery.

Autism Spectrum: Does Dolphin-Assisted Therapy Have Healing Effects?

Lori Marino and Scott O. Lilienfeld

Dolphin-assisted therapy (DAT) is a popular treatment for a host of mental disorders and developmental disabilities. In particular, DAT is widely used around much of the world for autism spectrum disorder and other developmental disabilities in children, adolescents, youth, and adults. DAT typically involves swimming or interacting with captive dolphins with the expectation that contact with them generates powerful therapeutic effects. DAT was introduced in the 1970s and has become a highly lucrative business in several countries, including the United States. Most captive dolphin parks offer some version of a DAT experience for visitors, and many advance nonspecific and often expansive claims about its effectiveness. In doing so, they may appeal to a range of explanations, including increased concentration abilities, reward, changes in brain waves, and the purported "healing effects" of echolocation (the sonar that dolphins use to locate and identify living and nonliving objects). DAT facilities typically charge visitors exorbitant fees for "treatments" that can last anywhere from one session to several sessions over a week, and no professional

accreditation is required.

DAT's popularity notwithstanding, several methodological reviews of published studies have revealed that there is no credible scientific evidence for its long-term effectiveness for autism spectrum disorder or any other condition (Humphries 2003; Marino and Lilienfeld 1998; Marino and Lilienfeld 2007a; Marino and Lilienfeld 2007b). Virtually all published studies alleging the effectiveness of DAT are seriously methodologically flawed and lack both internal validity (experimental rigor) and external validity (generalizability). For example, few if any studies adequately account for the nonspecific effects of hope and support from mental health professionals, so any apparent benefits of DAT may merely be due to what psychologists term a placebo effect—improvement resulting from the mere expectation of improvement. In addition, there is no compelling evidence that the seeming effects of DAT reflect anything more than the short-term boost in mood resulting from interacting with a highly charismatic and intelligent animal. In short, there remains no credible peer-reviewed evidence that DAT is scientifically legitimate.

Several methodological reviews of published studies have revealed that there is no credible scientific evidence for dolphin-assisted therapy's long-term effectiveness for autism spectrum disorder.

Most DAT facilities rely largely or entirely on testimonials from customers to tout their business. Nevertheless, testimonial evidence alone is insufficient to conclude that a treatment works. For example, customers who have something positive to say are often unrepresentative of all customers. Moreover, parents may notice naturally occurring improvements in their children's behavior and mistakenly attribute them to DAT.

Aside from being scientifically unsupported, DAT is ethically problematic for several other reasons. First, DAT centers inform vulnerable and at times even desperate individuals that an unsupported technique is highly effective. Moreover, some children and adults have been injured, in a few cases seriously, while swimming with captive dolphins. In addition, the dolphins used in DAT facilities are forced to participate in these activities in confined, often unhealthy, settings. Therefore, DAT is a physically risky, expensive, and ethically problematic intervention that is premised on unsubstantiated scientific assertions.

Inattention and Hyperactivity: Does Brain Balancing Improve Attention?

Christian Jarrett

Some treatment providers for attention-deficit/hyperactivity disorder (ADHD) claim the root cause of ADHD is diminished right-hemisphere brain function, which is fixed by their "sensory-motor" exercises. Unfortunately, this account of ADHD is a gross oversimplification. No honest expert knows what the correct or equal balance between the brain hemispheres ought to be, especially because the relative involvement of each hemisphere will vary according to task demands. While it is true that many studies point to abnormal lateralization of function in ADHD—unusual activation of one hemisphere or the other, compared with controls—findings in this area are incredibly messy, and there is certainly no consensus that these activation patterns represent the root cause of the condition.

In short, there are not any well-done studies to show that "brain balancing" improves attention.

For instance, while there is some evidence for reduced right-hemisphere function in people with ADHD compared to controls, other studies have

actually documented enhanced right-hemisphere function (Hale et al. 2005). Another study found enhanced transfer of information across the hemispheres in teens with ADHD, contradicting the central "brain balancing" idea that ADHD is caused by disconnection between the hemispheres (Brown and Vickers 2004).

Despite claims of ground-breaking research to support the brain balancing approach, only one published pilot study (Leisman et al. 2013) supports the use of brain balancing exercises for the treatment of ADHD, and it lacked any control group (Leisman et al. 2010). Curiously, what appear to be the exact same participants and data return in a second paper presented as new research three years later, now with a control group bolted on. There was obviously no randomization to this control group, and they engaged in no comparison treatment. What's more, the children who completed the brain balancing exercises and the controls were all taking stimulant medication during the study. In short, there are not any well-done studies to show that "brain balancing" improves attention.

Learning: Should Children Be Taught Based on Their Preferred Learning Style?

Indre Viskontas

Every first-time parent is surprised at how quickly their child's character appears: whether they're spirited or compliant, shy or outgoing, every child is unique. And the emphasis on developmental milestones online and in the pediatrician's office has parents and teachers mentally checking boxes every month and comparing their children's behavior and abilities with his or her peers. Well-meaning parents and teachers often reinforce activities in which the child shows precociousness while limiting time in tasks that expose weaknesses—exactly the opposite of what is needed. Research has shown that conditions that make learning seem more difficult are actually more effective for long-term retention (Bjork 1994). For example, spending an hour a day over the course of several weeks reviewing material for an exam is a better way of ensuring you'll remember it a year later than waiting until the night before and cramming for eight hours. Distributing versus massing practice is just one "desirable difficulty" that slows down the rate of learning in the short term but provides long-term benefits. Even though it *feels* harder, it ultimately leads to better learning outcomes, if the goal is to retain information for the long term. What's more, when tasks feel easy, we intuitively believe that we are learning. But while we make large gains in learning a new skill at first, with repeated practice, we experience diminishing returns (Heathcote et al. 2000). Once it feels easy, we've stopped learning. By the same token, teaching students using a variety of styles is much more effective than sticking to one mode of instruction. Students might differ in their preferences, or in what feels easy to them, but the evidence shows that teaching students only in their preferred learning style is not effective (Pashler et al. 2008). Different material might benefit from different modalities, but students should be exposed to a diverse array of teaching styles, and those that feel most difficult might end up yielding the best results.

Research has shown that conditions that make learning seem more difficult are actually more effective for long-term retention.

Tics: Can a Dental Device Decrease Tics?

Grant Ritchey and Clay Jones

Whenever gaps in the scientific understanding of a challenging medical condition exist, you can be con-

Patients with Tourette's are especially vulnerable to all manner of blatant snake-oil salesmen and well-meaning believers in implausible and unsupported remedies.

fident that there will be a long line of people attempting to fill those gaps with unscientific diagnostic and treatment recommendations. Tic disorders, in particular Tourette's syndrome, are no exception to this rule. In fact, because of its unique and fascinating clinical presentation, patients with Tourette's are especially vulnerable to all manner of blatant snake-oil salesmen and well-meaning believers in implausible and unsupported remedies.

One mode of unconventional therapy being marketed is the fabrication of a dental appliance to manage tics. The hypothesis behind this approach is that many of the habitual movements of people with Tourette's are due to reflexive tics of muscles innervated by the trigeminal nerve, or Cranial Nerve V (which also innervates the mandible, or lower jaw). This observation is then extrapolated to infer that the symptoms of Tourette's and other movement disorders are a function of an "overstimulation" of the neural impulses carried by the trigeminal nerve to the brain due to dysfunction within the temporomandibular (jaw) joint. Realigning the mandible, therefore, will ostensibly reduce this "neural noise," resulting in a reduction or elimination of tics.

While this might have a small amount of biological plausibility, there is very little good research to support this approach. A handful of case reports can be found in the literature, but they demonstrate very little evidence. Tics are found in all muscle groups, not just those innervated by the trigeminal nerve. Moreover, it cannot explain the other features of Tourette's not correlated with jaw position (e.g., brain chemistry changes, familial and genetic patterns).

More studies are needed, but as of now, this treatment cannot be recommended or endorsed. We go into greater detail on dental appliances and tics on the *Science-Based Medicine* blog (Ritchey and Jones 2016; Ritchey and Jones 2018).

Should Children Be Taught about Pseudoscience?

Henry Hupp

The importance of pseudoscience has fallen between the cracks for many educators in American schools. If more teachers incorporated critical thinking about pseudoscience into lectures and discussions, students would be able to better prepare themselves for a future of differentiating what is truth and what is fiction. In his address to congressional representatives about quackery, James Randi (1999) explained, "A properly educated and informed public would know about this, and protective laws would not be required. Again, education is the key." In this quote from his speech, Randi was speaking about how the government needs to intervene on pseudoscientific practices plaguing the United States. More education about pseudoscience would help people be able to defend themselves from misinformation.

More education about pseudoscience would help people be able to defend themselves from misinformation.

To fully educate the American people, the schooling system is one critical place students can learn about skepticism at an early age so they can continue to use critical thinking throughout adulthood. What people learn at an early age can shape what one believes as an adult. The main takeaway is that what youth learn matters, and everyone deserves the opportunity to be taught critical thinking about pseudoscience at school. For more about teaching skepticism to youth, see Lilienfeld (2017). ■

Note

1. The authors are listed in the order that their work appears in the book. Authors were only involved in their own entries and were not involved in writing or editing the other sidebars.

References

Barrett, S. 2012. Why cranial therapy is silly. Available online at https://www.quackwatch.org/01QuackeryRelatedTopics/cranial.html.

Bjork, R.A. 1994. Memory and metamemory considerations in the training of human beings. In J. Metcalfe and A. Shimamura (eds.), *Metacognition: Knowing about Knowing*. Cambridge, MA: MIT Press, 185–205.

Brown, L.N., and J.N. Vickers. 2004. Temporal judgments, hemispheric equivalence, and interhemispheric transfer in adolescents with attention deficit hyperactivity disorder. *Experimental Brain Research* 154(1): 76–84.

Hale, T.S., J.T. McCracken, J.J. McGough, et al. 2005. Impaired linguistic processing and atypical brain laterality in adults with ADHD. *Clinical Neuroscience Research* 5(5–6): 255–263.

Hanten, W.P., D.D. Dawson, M. Iwata, et al. 1998. Craniosacral rhythm: Reliability and relationships with cardiac and respiratory rates. *Journal of Orthopaedic & Sports Physical Therapy* 27: 213–218.

Hartman, S.E., and J.M. Norton. 2002. Craniosacral therapy is not medicine. *Physical Therapy* 82: 1146–1147.

Heathcote, A., S. Brown, and D.J.K. Mewhort. 2000. The power law repealed: The case for an exponential law of practice. *Psychonomic Bulletin & Review* 7(2): 185–207.

Humphries, T.L. 2003. Effectiveness of dolphin-assisted therapy as a behavioral intervention for young children with disabilities. *Bridges: Practice-Based Research Synthesis* 1: 1–19.

Leisman, G., R. Melillo, S. Thum, et al. 2010. The effect of hemisphere specific remediation strategies on the academic performance outcome of children with ADD/ADHD. *International Journal of Adolescent Medicine and Health* 22(2): 275–284.

Leisman, G., R.Z. Mualem, and C. Machado. 2013. The integration of the neurosciences, child public health, and education practice: Hemisphere-specific remediation strategies as a discipline partnered rehabilitation tool in ADD/ADHD. *Frontiers in Public Health* 1: 22.

Lilienfeld, S.O. 2017. Teaching skepticism: How early can we begin? Skeptical Inquirer 41(5): 30–31.

Marino, L., and S.O. Lilienfeld. 1998. Dolphin-assisted therapy: Flawed data, flawed conclusions. *Anthrozoos* 11: 194–199.

———. 2007a. Dolphin assisted therapy: More flawed data, more flawed conclusions. *Anthrozoos* 20: 239–269.

———. 2007b. Dolphin assisted therapy for autism and other developmental disorders: A dangerous fad. *Psychology in Intellectual and Developmental Disabilities (Division 33), American Psychological Association* 33(2): 2–3.

Pashler, H., M. McDaniel, D. Rohrer, et al. 2008. Learning styles: Concepts and evidence. *Psychological Science in the Public Interest* 9(3): 105–119.

Randi, J. 1999. James Randi on quackery and the need for science education. Available online at www.skeptic.com.

Ritchey, G., and C. Jones. 2016. Use of dental appliances in the management of Tourette syndrome. Available online at https://sciencebasedmedicine.org.

———. 2018. Tic'd off. Available online at https://sciencebasedmedicine.org.

Rogers, J.S., P.L. Witt, M.T. Gross, et al. 1998. Simultaneous palpation of the craniosacral rate at the head and feet: Intrarater and interrater reliability and rate comparisons. *Physical Therapy* 78: 1175–1185.

Shapiro, B.K., and M.L. Batshaw. 2011. *Intellectual Disability*. *Nelson Textbook of Pediatrics*, 19th ed. Philadelphia, PA: Saunders Elsevier, 216–222.

Wirth-Pattullo, V., and K.W. Hayes. 1994. Interrater reliability of craniosacral rate measurements and their relationship with subjects' and examiners' heart and respiratory rate measurements. *Physical Therapy* 74: 908–916.

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Millennials and Post-Millennials —Dawning of a New Age?

Greta Thunberg's clarion call at the United Nations offers hope that emerging generations will use science and reason to address our planet's urgent problems.

JEANNE GOLDBERG

Baby boomers, who ushered in the proverbial "Age of Aquarius" in the sixties, have held leading positions in government, business, and other spheres of activity for the past four decades or so. Many global and domestic leaders of that demographic feel that they have pursued a progressive and reasoned path as they have tackled a variety of complex issues.

On September 24, 2019, however, Greta Thunberg, a sixteen-year-old Swedish climate activist, delivered a dressing down to leaders at the United Nations. Her remarks, simultaneously passionate and rational, sternly reprimanded them for ignoring the existential threat of climate change by continuing to support fossil-fuel–based energy sources. She expressed anger at the thought that her future—and those of all young people—would be stolen if those in power didn't take steps immediately to address the threat.

We can hope that Thunberg's speech at the United Nations will propel leaders to take actions. At the very least, her remarks are thought provoking, bringing into focus the potential galvanizing power of youth and their concern about the health of Planet Earth. As Thunberg's generation (the post-millennials or Generation Z, born from 1997 onward) and the slightly older generation of the millennials (born between 1981 and 1996) assume roles in our society and, by extension, in global societies, how will they address issues such as climate change? How will they cope with pseudoscience, conspiracy theories, and the war on science? Will they be skeptical inquirers?

The millennial generation, or "Generation Exoplanet," as Neil deGrasse Tyson has dubbed it (Martine 2014), has taken over the spotlight in recent years as they have matured and stepped into leadership roles. Much has been written about them, attempting to characterize them and to predict the actions they will take on a variety of issues. A critical question is how they will approach issues involving the intersection of science and religion.

The Pew Research Center (PRC) has a wealth of information on our country's generations, including the millennials, using generational cohorts to study how today's younger generations compare with today's older generations when they were young. However, its president, Michael Dimock, sagely notes that "generations are a lens through which to understand societal change, rather than a label with which to oversimplify differences between groups" (Pew Research Center 2019a).

In a carefully researched study titled "Against Generations," Rebecca Onion gives a historical review of generation theory and concludes that grouping individuals together to form stereotypic profiles (as we do according to their birth dates, for example) is simplistic and irrational, overlooking diversity of race, ethnicity, geography, and life experiences. These stereotypes can even constitute a form of bigotry and lead to intergenerational conflict. Onion cites the work of Karl Mannheim, who stated the importance of recognizing

this diversity; she cites the differences between youth in Fairfax County, Virginia, for example, versus those living on the South Side in Chicago (Onion 2015).

At a given point in time, individuals in a particular demographic group can exhibit striking differences in educational backgrounds, employment, housing, family structures, political orientation, and religious views. Nevertheless, a given generation may have witnessed and have been affected by the same global or domestic events. The Great Recession and the terrorist attacks of September 11, 2001, for example, represent impactful, shared experiences for most members of the millennial generation.

Today, in 2019, the millennial generation is the largest demographic group in the United States with 73 million members, outnumbering the baby boomers, who number 72 million (Searing 2019). They comprise about 25 percent of the U.S. population, and globally one of every four persons is likewise a millennial. Thirty percent of the U.S. voting age population and 40 percent of the working age population is in this group. The millennial generation represents a demographic bridge to America's diverse future, according to a recent Brookings Institution report. The white, non-Hispanic population comprised 68.4 percent of the pre-millennials (over age thirty-eight) but a significantly lower 51.5 percent of the post-millennials (individuals younger than age twenty-two). Twenty-five percent of the post-millennials are Hispanic (Metropolitan Policy Program 2018).

Even considering intragenerational differences, a snapshot view of millennials reveals that they are well educated, with 39 percent having a bachelor's degree or higher, compared to about 25 percent of baby boomers. More millennial women have bachelor's degrees compared to women of earlier generations and compared to millennial men, and more of them are in the workforce. The millennials have felt the impact of the Great Recession and have fewer financial reserves compared to generations that preceded them. Fewer of them own homes, and they marry and have children at later ages (Pew Research Center 2019b).

One of the defining characteristics of this generation is the fact that they are digital natives, communicating and obtaining information through social media. They have been strongly influenced by the forces of globalization and by technology, and Facebook, Instagram, and Twitter are integral parts of their daily lives; in fact, 41 percent of global millennials have a social media account (Cosseboom 2015).

Millennials are, for the most part, not "joiners," deriving satisfaction in the digital infrastructure that they have created for themselves. This reality is frustrating and puzzling to many organizations, most notably religious organizations and churches. Approximately one in four millennials are unaffiliated with any specific faith. A 2014 Barna study found that 59 percent of millennials who grew up in the church have dropped out at some point (Barna Group 2014). When asked about their reasons for dropping out, they cited the church's irrelevance, hypocrisy, and the moral failures of the leaders. Some expressed real "spiritual" needs that weren't addressed by churches.

There is a commonly shared view that the millennials' religious disaffiliation represents a true generational change. Macrina Cooper-White states that their habits of not attending religious services, their disapproval of religious organizations, and their statements that religion isn't important to them represent a cultural phenomenon. She attributes individualism as the driver of these changes, stating that "religious involvement was low when individualism was high" (Cooper-White 2015).

Michael Hout, professor of sociology at New York University and an expert on generational and religious changes in the United States, points out that many millennials have baby boomer parents who have promoted the ideal of thinking for oneself and finding one's own moral compass. He also feels that the loss of faith in religious organizations is just one manifestation of a generalized loss of faith in all institutions, including the labor market, government, and even marriage.

A critical question is how millennials will approach issues involving the intersection of science and religion.

Hout doesn't see any evidence that the distrust of churches and organized religion among millennials will abate as they age (Pew Research Center 2016).

They are also abandoning religious affiliations, mainly Catholic and Protestant, because many of them feel that churches have mixed religion and politics. Evangelical churches in particular have embraced policies that are judgmental, anti-LGBTQ, and antiscience (especially as related to climate change), and, as a result, millennials are leaving them. Sexual abuse scandals in the Catholic Church have also played a role in the exit.

The increase in the numbers of the religiously unaffiliated, the Nones, in recent years is heartening to us as secularists and skeptical inquirers. The 2015 Pew Research Center poll found that approximately 35 percent of millennials are Nones. A new Pew Research survey, released on October 17, 2019, demonstrates that all demographics of the religiously unaffiliated populations are growing rapidly in the United States, with the growth in numbers of disaffiliated young adults having markedly increased since previous surveys. Remarkably, there has been a decrease in the absolute number of Christians from 178 million in 2009 to approximately 167 million today, despite an increase in the U.S. population by 23 million individuals! In addition, "self-described atheists now account for 4% of U.S. adults, up modestly but significantly from 2% in 2009; agnostics make up 5% of U.S. adults, up from 3% a decade ago; and 17% of Americans now describe their religion as 'nothing in particular,' up from 12% in 2009" (Pew Research Center 2019c). Nevertheless, one must question whether this increase may be at least partially due to the fact that more individuals feel free to state that they are unaffiliated. Interestingly, most Nones do not label themselves as atheists or agnostics. Is this because our society still frowns

upon these descriptions, or does it indicate that these individuals are not actively opposed to religion? Could these same people be attracted to unconventional "religions" or practices?

Michael Shermer cites a 2014 survey of individuals, not all of whom were millennials, conducted by the Austin Institute for the Study of Family and Culture that found that of the 13.2 percent of individuals who classified themselves as atheist or agnostic, 32 percent professed a belief in the afterlife or a sort of conscious existence after death. His incredulity is certainly understandable, but he states that he suspects these "nonbelievers" might be moving away from traditional religion to New Age belief systems, perhaps even holding out hopes that scientific developments such as uploading the mind or cloning might facilitate an afterlife or some semblance of one. Many who are religiously unaffiliated still profess a belief in a "god" and state that they are spiritual. Berkeley sociologist Casey Homan describes two definitions of spirituality, one recognizing the interconnectedness of the world and the other integrating beliefs in the supernatural and paranormal. He believes that millennials often describe themselves as "spiritual but not religious" to avoid being classified as an atheist (immoral) or a Christian (a political conservative) (Stone 2018).

Matthew Hedstrom, associate religious studies professor at the University of Virginia, has studied the millennials' move away from organized religion in a search for alternate methods to satisfy their spiritual needs. He states that consumer capitalism offers myriad appealing "religious products" that they can select instead of subscribing to the dogma of organized religion (Newman 2015).

The term *religious products* raises red flags for a skeptical inquirer. Some disturbing trends have developed within this generation in recent years. Incredibly, there are a few millennial flat-earth proponents and conspiracy theory advocates regarding the moon landing. Astrology and its sidekick of "retrogrades" (an apparent change in the movement of a planet through the sky) have gained a following too. A new article in the *New Yorker* (October 28) describes the soaring popularity of astrology and the fact that it is ubiquitous on the web, social media, mobile apps, and downloadable formats. The author, Christine Smallwood, postulates that its appeal may be related to a search for meaning in a life devoid of the dogma associated with organized religion. Economic uncertainties, dissatisfaction with the current political situation in our country, and a feeling of being powerless in a chaotic world may be additional factors (Smallwood 2019). Stuart Vyse has studied the appeal of astrology to youth, remarkably in those with a liberal orientation, and he has described it as a tool to supply a sense of control over their lives, especially during stressful times (Vyse 2018). Others ascribe the pop-

There is a commonly shared view that the millennials' religious disaffiliation represents a true generational change.

ularity of astrology, tarot card readings, and Skype psychic consultations as methods to address anxiety and uncertainty about the future and maybe even to blame an outside force beyond their control for misfortunes. Many members of the millennial generation have been deeply affected by the Great Recession, and economic woes coupled with student debt may add to their concerns. Interestingly, several young subscribers to the astrology app have indicated that the app offers them comfort even though they don't necessarily believe the message that it conveys.

Elizabeth King, a self-described millennial evangelical-turned-atheist, states that her church made her feel so guilty and uncomfortable that she has turned to the therapist's couch for comfort. She told her doctor that "I think therapy is our new church" (King 2016).

Although there is evidence of an inverse relationship between educational level and belief in these pseudoscientific practices, it is ironic that in the Silicon Valley, one of the least religious areas of the country, spirituality-focused products are thriving. Entrepreneur Tara-Nicholle Nelson has created a startup, SoulTour, described as a "hybrid social network app and offline community that provides religion-agnostic uplifting content." Nelson describes SoulTour as a means to address the spiritual void felt by many young millennial technology workers by offering meditations, self-help mantras, and other products via a monthly mobile phone subscription model (Stone 2018).

Additional entrepreneurial ventures include such products as Headspace, an iPhone app that focuses on meditation and mindfulness techniques. This app, created by Andy Puddicombe, a forty-six-year-old British man who trained and practiced for many years as a Buddhist monk, has been embraced by many millennials—and not just in Silicon Valley, where it has fit neatly into the culture of techno-utopianism. Corporations such as Goldman Sachs and Dana-Farber Cancer Institute have purchased bulk subscriptions to Headspace for their employees. Puddicombe states that he has addressed skeptics by "pulling the science lever" and promoting studies run by neuroscientists that he has recruited to show improvements in such areas as improved sleep habits (Widdicombe 2015). Of course these studies do not meet the gold standard of randomized controlled studies.

Despite the pseudoscientific proclivities mentioned above, it is important to understand that many millennials have a profound interest in science, and many are fascinated by its potential to solve world problems, in particular climate change. In an article in *The Atlantic*, Alexandra Ossola describes the web publication "I F*cking Love Science," which has 18 million likes on Facebook, compared to 2 million likes for *Scientific American* and 2.8 million likes for *Popular Science* (Ossola 2014). Despite the publication's issues with accusations of sensationalism and allegations of plagiarism, its wild success is a testament to the appetite for science-related stories in its audience, mostly millennials.

Ossola credits Bill Nye the Science Guy for stimulating millennials' interest in science in addition to their access to huge amounts of online scientific information. Carl Sagan and Neil deGrasse Tyson have been especially effective science communicators who have stimulated many young people's interest and enthusiasm about science.

Even though television, social media, podcasts, and mobile phone apps are significant sources of scientific information, it is often a teacher who sparks an interest in science. Fortunately, science teachers have some innovative tools in their armamentarium these days to make an impact on young people. For example, the Teacher Institute for Evolutionary Science (TIES), a program of the Center for Inquiry (CFI) funded by the Richard Dawkins Foundation for Reason & Science, is an example of a successful program of workshops in every state whose goal is to offer middle school science teachers exciting videos, hands-on laboratory experiments, and other instructional tools to teach students evolution. This program addresses evolution, a potentially divisive issue in schools, in a scientifically accurate nonconfrontational manner, using real life examples of the unifying force of evolution in our daily lives.

Many millennials have baby boomer parents who have promoted the ideal of thinking for oneself and finding one's own moral compass.

Scientific issues are extremely politicized in the United States today, but fortunately many millennials are issue-oriented and are willing to work with others across religious, ethnic, partisan, and national boundaries to solve problems. In fact, many have a global perspective and feel that they may have more in common with others in their age group in other countries who share common interests (e.g., in science) but are geographically distant.

Science provides a common universal language, and a "democratization" process occurs as individuals with diverse cultures and levels of scientific expertise share information with each other online. Paradoxically, climate change—an existential threat to the planet—may act as a galvanizing force to unite global millennials. Its urgency requires scientifically valid actions, free of religious partisan delusions. Jesse Zondervan, a millennial PhD geoscience student at the University of Plymouth, states that his generation of scientists, clustered in key global, urban, mega-regions, will be in the forefront of change in the future. He foresees religion possibly being replaced by technology as geographic boundaries such as the nation state fade away, and he feels that "the combination of globalization and cultural change in the world-view gives rise to an interesting and powerful way we interact with the earth around us" (Zondervan 2018).

Climate change has certainly been a galvanizing issue

among the youth in the United States. Young Republicans accept the science validating climate change and demonstrate a willingness to unite with others to address it. In fact, 36 percent of millennial Republicans believe in anthropogenic climate change, double the percentage of believers in their parents' baby boomer generation. This gap is also present regarding energy issues such as fracking. There is hope that the attitudes among the youth may influence older Republicans' viewpoints on these issues and lead to action on climate-related issues (Paulson 2018).

Many millennials are issue-oriented and are willing to work with others across religious, ethnic, partisan, and national boundaries to solve problems.

One of the strongest determinants of how issues involving the intersection of religion and science will be addressed is the profile of the electorate. In the United States in 2020, 37 percent of the electorate will be made up of millennials and post-millennials, and they are more likely to be Democratic, liberal, and environmentally conscious than previous generations. Hopefully they will demand scientifically literate individuals to represent them in government.

Millennials and their younger counterparts, the post-millennials, represent generations that are and will continue to be distinctly different from the generations that preceded them. As skeptical inquirers, we hope that Greta Thunberg's speech at the United Nations this year was a clarion call—a passionate appeal for rational, scientific approaches to problem solving in a world whose very existence is under threat. ■

References

Barna Group. 2014. Americans divided on the importance of church (March 24). Available online at https://www.barna.com/research/americans-divided-on-the-importance-of-church/.

Cooper-White, Macrina. 2015. Millennials are the least religious generation yet, and here's the surprising reason why. *Huffington Post* (May 27). Available online at https://huffingtonpost.com/2015/05/27/millennials-less-religious_n_7452998.html.

Cosseboom, Leighton. 2015. 9 ways millennials are driving Southeast Asia's tech boom (blog entry). *Tech in Asia* (November 18). Available online at https://www.techinasia.com/southeast-Asia-millennials-technology-adoption.

King, Elizabeth. 2016. Atheist millennials are finding spirituality on the therapist's couch instead of the church pew. *Quartz* (September 30). Available online at https://qz.com/796630/millennials-are-finding-spirituality-on-the-therapists-couch-instead-of-the-church-pew.

Martine, Chris. 2014. Defining Neil deGrasse Tyson's 'Generation Exoplanet' (blog entry). *Huffington Post* (April 7). Available online at https://www.huffpost.com/entry/defining-neil-degrasse-tysons-generation-exoplanet_b_4703526.

Metropolitan Policy Program. 2018. Millennials are the most diverse generation in U.S. history, now 44 percent minority, says new Brookings report (January 24). Available online at http://brook.gs/2DqEa15.

Newman, Caroline. 2015. Why millennials are leaving religion but embracing spirituality (blog entry). *Phys Org* (December 15). Available online at https://phys.org/news/2015-12-millennials-religion-embracing-spirituality.html.

Onion, Rebecca. 2015. Against generations (blog entry). *Aeon* (May 19). Available online at https://aeon.co/essays/generational-labels-are-lazy-useless-and-just-plain-wrong.

Ossola, Alexandra. 2014. Why millennials &%#@! love science. *The Atlantic* (October 29). Available online at https://www.theatlantic.com/education/archive/2014/10/why-millennials-love-science/382015/.

Pew Research Center. 2016. Q & A: Why millennials are less religious than older Americans (January 8). Available online at http://www.pewresearch.org/fact-tank/2016/01/08/a-why-millennials-are-less-religious-than-older-Americans/.

———. 2019a. Defining generations: Where millennials end and Generation Z begins (January 17). Available online at http://www.pewresearch.org/fact-tank/2019/01/17/where-millennials-end-and-generation-z-begins/.

———. 2019b. Millennial life: How young adulthood today compares with prior generations (February 14). Available online at http://www.pewsocialtrends.org/essay/millennial-life-how-young-adulthood-today-compares-with-prior-generations/.

———. 2019c. In U.S., decline of Christianity continues at rapid pace (October 17). Available online at https://www.pewforum.org/2019/10/17/in-u-s-decline-of-christianity-continues-at-rapid-pace/.

Paulson, Amanda. 2018. Why these young Republicans see hope in climate action. *The Christian Science Monitor* (June 28). Available online at https://www.csmonitor.com/Environment/2018/0628/Why-these-young-Republicans-see-hope-in-climate-action.

Searing, L. 2019. The big number: Millennials to overtake boomers in 2019 as largest U.S. population group. *Washington Post* (January 25). Available online at https://www.washingtonpost.com/national/health-science/the-big-number-millennials-to-overtake-boomers-in-2019-as-largest-us-population-group/2019/01/25/a566e636-1f4f-11e9-8e21-59a09ff1e2a1_story.html.

Smallwood, Christine. 2019. Astrology in the age of uncertainty. *The New Yorker* (October 28). Available online at https://www.newyorker.com/magazine/2019/10/28/astrology-in-the-age-of-uncertainty.

Stone, Zara. 2018. How a spirituality startup is solving Silicon Valley's religious apathy. *Forbes* (April 26). Available online at www.forbes.com/sites/zarastone/2018/04/26/how-a-spirituality-startups-solving-silicon-valleys-religious-apathy/#67c7c5912ed9.

Vyse, Stuart. 2018. Why are millennials turning to astrology? Skeptical Inquirer (May 18). Available online at https://skepticalinquirer.org/exclusive/why_are_millennials_turning_to_astrology/.

Widdicombe, Lizzie. 2015. The higher life: A mindfulness guru for the tech set. *New Yorker Magazine* (July 6). Available online at https://www.newyorker.com/magazine/2015/07/06/the-higher-life.

Zondervan, Jesse. 2018. Millennial scientist in a segregating world—the role of science in shaping society. *Impakter* (January 4). Available online at https://impakter.com/millennial-scientists-in-a-segregating-world-the-role-of-science-in-shaping-society/.

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Advocacy for a Cognitive Approach to Electrohypersensitivity Syndrome

Electrohypersensitivity syndrome may have little to do with actual exposure to electromagnetic radiation. It instead may be better understood as a phobia explained by anxiety disorder mechanisms.

SÉBASTIEN POINT

Development of communication technologies (such as mobile phones and other wireless devices) has been followed in the past twenty years with appearance of a new self-assessed, so-called electrohypersensitivity (EHS) syndrome, which some people—including some medical doctors—attribute to permanent exposure to domestic, low levels of electromagnetic radiation. EHS syndrome is not the only potential concern raised by people worried about electromagnetic radiation; effects on cognition, sleep, and tumor initiation or growth have been pointed out—without convincing scientific evidence or satisfying proposals regarding potential biological mechanisms. But until now, EHS (also often called electromagnetic hypersensitivity) syndrome seems to have been about the supposed health effects of exposure to electromagnetic radiation. Some studies (Hallberg and Oberfeld 2006; Eltiti et al. 2007; Schröttner and Leitgeb 2008) tried to count EHS-affected people, which is a difficult task because of the lack of a medical description of EHS syndrome. Results of these studies are shown in Figure 1. A continuous increasing trend is observed in EHS self-diagnoses between 1985 and 2005, although the latest studies suggest a decrease.

In the face of numerous claims regarding adverse health effects of electromagnetic radiation in general—and EHS syndrome in particular—the French Agency for Food, Environmental, and Occupational Health & Safety (ANSES) emphasized in its 2018 report the need for taking care of people suffering from EHS syndrome, although it did not recognize the causal relationship between electromagnetic radiation and EHS syndrome (ANSES 2018). In parallel, for some years, an increasing number of court decisions have recognized the right of individuals suffering from EHS syndrome to refuse wireless technologies for medical reasons, and some judges have *decided* a causal relationship between electromagnetic radiation and EHS syndrome. Mass media are also interested in the problem, and it is easy to find numerous online testimonials of people suffering from EHS syndrome.

Scientists have tried to clarify the nature of this EHS syndrome and to verify the reality of the alleged relationship with exposure to electromagnetic radiation. In this article, I will summarize results produced by provocation studies and share my view that the etiology of the EHS syndrome is not

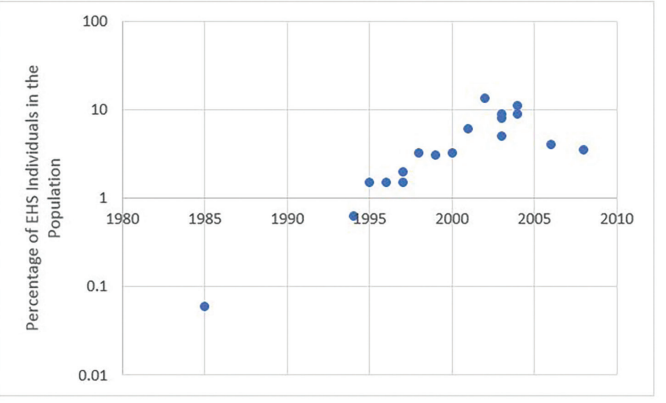

Figure 1: Percentage of EHS individuals in the population as measured in different European countries between 1985 and 2008 (adapted from Bellayer 2016).

related to real exposure to electromagnetic radiation. Instead, a phobia-like disorder should be investigated as a possible explanation of EHS syndrome.

Provocation Studies

Biological effects of electromagnetic radiation are taken into account by normative standards based on International Commission on Non-Ionizing Radiation Protection (ICNIRP) statements (ICNIRP 1998). Normative exposure limits aim to protect people from high doses of electromagnetic radiation, which can result in electrical or thermal effects (or both) depending on radiation frequency. Indeed, induced currents or temperature elevation are the only proven biological adverse effects associated with acute exposure to electromagnetic radiation (Perrin and Souques 2012). In Europe, directive 2013/35/EU has been created to protect workers from exposure to conditions able to generate such effects. However, EHS syndrome is claimed to appear when people are exposed to *low levels* of electromagnetic radiation.

Mass media are also interested in the problem, and it is easy to find numerous online testimonials of people suffering from electrohypersensitivity syndrome.

A provocation study or trial is a form of medical clinical trial frequently used in this field. Participants are exposed to a substance or device claimed to provoke a response or to a sham substance or device that should provoke no response. Several provocation studies have been conducted in an attempt to reveal a potential relationship between exposure to electromagnetic radiation at low levels and EHS syndrome. The premise is quite simple: as EHS people claim to suffer from various symptoms when they are exposed to electromagnetic radiation, experiments should be able to examine the phenomenon by comparing the level of discomfort of EHS people depending on exposure conditions measured against a control population. Such studies must deal with a potential low-dose effect—what makes experiments sensitive to confusing variables. Thus, to be usable, such experiments must at least be single-blinded and if possible double-blinded, randomized, and counterbalanced.

Several authors have tried to create such experiments. One full and relevant analysis of these provocation studies has been made by E. van Rongen and colleagues (2009), who conclude that in provocation studies a causal relation between electromagnetic radiation exposure and symptoms "has not been demonstrated, suggesting that psychological factors such as conscious expectation of effect may play an important role in this condition." This conclusion is shared by Renáta Szemerszky and colleagues (2010), who studied the role of the nocebo effect in physical symptoms reported at a frequency of 50 hertz. They found a considerable nocebo effect and noted the formation of "a vicious circle of psychosocial factors, such as enhanced perception of risk and expectations, self-monitoring, somatisation and somatosensory amplification, casualization, and misattribution."

A Cognitive Approach

On the one hand, provocation studies failed to determine a causal relationship with exposure to low levels of electromagnetic radiation, and there is no serious candidate for a biological mechanism. On the other hand, results of some studies show a significant number of people claiming to suffer from EHS syndrome. These contradictory observations call for a new pathway for investigations. As suggested by some authors, one possible etiology is psychological. I suggest a cognitive mechanism for explaining EHS syndrome as a potential form of phobia in which confirmation bias could have a central role. A view of my mechanism proposal is shown in Figure 2. The rationale and hypothesis used for building it are discussed below.

Biological Vulnerability

Anxious symptomatology has been described as under the influence of some genetic factors (Jardine et al. 1984; Kendler et al. 1992; Andrews 1996). Studying etiology of social phobia, Ronald M. Rapee and Richard G. Heimberg (1997) suggested that genetic factors may explain preferential allocation of attention toward danger. The role of the biological factor has been integrated in many models of anxiety, including the Jones and Barlow biopsychosocial model of post-trauma stress (Jones and Barlow 1992) and the Clark model of panic (Clark 1986). In this latest model, people suffering from panic disorders are excessively sensitive to some normal or pathological body perceptions, which they consider as a catastrophic threat and which can trigger a panic attack. The biological manifestation of this panic attack can amplify the perception of the threat. Some recent results have shown that this biological vulnerability to anxiety disorders, including depression and post-trauma stress, could be related to the volume of hippocampi (Campbell and MacQueen 2004; Bremner et al. 1995). The widely accepted theory of anxiety by Jeffrey A. Gray and Neil McNaughton (2003) also points out the main role of hippocampi in anxious behaviors. But some studies suggest that hippocampal volume evolution is not a result of anxiety, trauma, or depression but would be, to the contrary, a causative factor (Gilbertson et al. 2002). Biological vulnerability and preferential allocation of one's attention to threat is

accepted as one of the bases for the development of anxiety disorders. To consider EHS syndrome as a form of phobia, one has to make the fundamental hypothesis that EHS individuals carry, prior to the appearance of symptoms, this type of biological vulnerability.

Some recent results have shown that this biological vulnerability to anxiety disorders, including depression and post-trauma stress, could be related to the volume of hippocampi.

Alleged Exposure as Neutral Stimulus and Mental Representation of Health Disorders

Anxiety troubles are often associated with a neutral stimulus, as understood in a Pavlovian approach. If EHS syndrome is a phobia, alleged exposure to electromagnetic radiation could play the role of neutral stimulus. From my perspective, several cues support this assumption.

As demonstrated by provocation studies, people, including those claiming an EHS syndrome, are not able to detect electromagnetic radiation at domestic, low levels. As low-level radiofrequency electromagnetic radiation is neither visible nor detectable, exposure can be inferred only on the basis of cues such as the proximity of mobile phones or antennas. Yet some research has shown a strong relationship between the loss of perceived control and anxiety troubles (Gallagher et al. 2014). Exposure to electromagnetic radiation could be a neutral stimulus powered by the feeling that the person has no control over this exposure.

News media are more and more focused on potential effects of electromagnetic radiation, especially with the current deployment of 5G technology. This media treatment could encourage people to focus on mobile phones, antennas, or radiofrequency emitters existing in their environment and on physical perceptions when these people encounter or use them. Such a hypothesis is supported by recent results, especially those of Anne-Kathrin Bräsher and colleagues (2017), who showed that worrisome information on health effects of wifi increases discomfort during sham exposure; it also increases sensitivity to tactile stimuli. In their studies, Michael Witthöft and G. James Rubin (2013) concluded that "media reports about the adverse effects of supposedly hazardous substances can increase the likelihood of experiencing symptoms following sham exposure and developing an apparent sensitivity to it."

Symptoms of Anxiety

Symptoms claimed by EHS individuals are various and nonspecific. According to Marjukka Hagström and colleagues (2013), the most common symptoms are "stress" (60.3 percent), "sleeping disorders" (59.3 percent), and "fatigue" (57.2 percent). These symptoms are compatible with anxiety disorders, which can affect organs, glands, and the nervous system. In a cognitive approach, instead of considering anxiety (and all associated potential symptoms) as a collateral consequence of any real electrosensitivity, all these symptoms could be considered as existing prior to the appearance of the EHS syndrome (as a result of a biological vulnerability) and being recently associated with neutral stimulus (the alleged exposure to electromagnetic radiation).

Feedback Mechanism

It has been shown that reducing or avoiding electromagnetic radiation can help individuals suffering from EHS syndrome recover a better level of comfort (Hagström et al. 2013). Such avoidance behaviors and immediate well-being gain are typically observed in anxiety or panic disorders; alternatively, for the case of EHS individuals, some counter-phobic objects can be purchased, such as anti-radiation chips applied to mobile phones to allegedly reduce their emission level. Following such avoidance or defense behaviors, decreasing discomfort could act as a confirmation that the source of discomfort was related to electromagnetic radiation. This would possibly reinforce the belief of EHS individuals in adverse health effects of electromagnetic radiation.

It is also well accepted that anxious individuals do allocate their attention to threat (Dalgleish and Watts 1990), which could be an evolutionary strategy to protect the organism (Ohman 1996). Considering EHS syndrome as an anxiety disorder, this attentional focus on physical perceptions, related to the belief that the subject is exposed and that this exposure can result in adverse health effects, could amplify and reinforce the belief in a real threat.

The feedback mechanism I explored here (reinforcement of belief by attentional focus on symptoms and good results

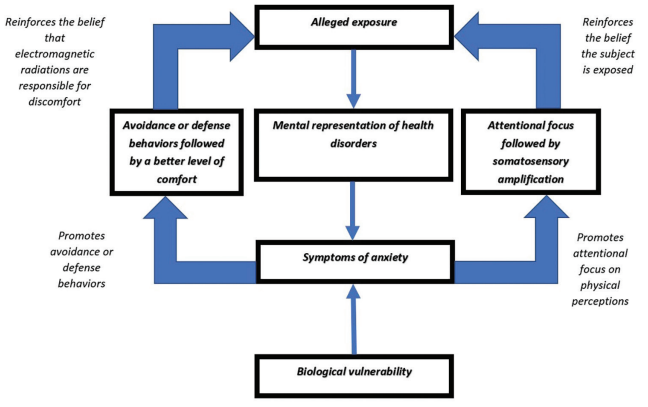
Reinforces the belief that electromagnetic radiations are responsible for discomfort
Alleged exposure
Reinforces the belief the subject is exposed
Avoidance or defense behaviors followed by a better level of comfort
Mental representation of health disorders
Attentional focus followed by somatosensory amplification
Promotes avoidance or defense behaviors
Symptoms of anxiety
Promotes attentional focus on physical perceptions
Biological vulnerability

Figure 2: Possible theoretical model of EHS syndrome considered as an anxiety disorder.

of avoidance strategy) could make the EHS individuals enter a loop of fear whose main engine is confirmation bias.

Conclusion

Science has failed to show a causal relationship between real exposure to electromagnetic radiation and EHS syndrome. There is, however, a growing accumulation of evidence that EHS syndrome is related to psychological factors. I have proposed that EHS syndrome could be a form of phobia explained by mechanisms occurring in other anxiety disorders. Biological vulnerability to anxiety—existing prior to the appearance of EHS syndrome—would cause people to confound symptoms of anxiety with a biological effect of electromagnetic radiation. Alleged exposure to electromagnetic radiation would play the role of neutral stimulus.

Science has failed to show a causal relationship between real exposure to electromagnetic radiation and EHS syndrome.

Finally, confirmation bias—based on attentional focus and avoidance strategies—would push people still deeper in their belief.

Researchers should now stop (or at least reduce their efforts) trying to find a less-and-less plausible link between EHS syndrome and electromagnetic radiation and instead concentrate their work on understanding more accurately the mechanisms pushing people to the wrong belief that domestic, low levels of electromagnetic radiation are deleterious. Researchers should find a way to help these people by decreasing anxiety and discomfort through adapted cognitive behavioral therapy techniques. ■

References

Andrews, G. 1996. Comorbidity in neurotic disorders: The similarities are more important than the differences. In R.M. Rapee (ed.), *Current Controversies in the Anxiety Disorders*. New York: The Guilford Press, 3–20.

ANSES. 2018. Hypersensibilité électromagnétique ou intolérance environnementale idiopathique attribuée aux champs électromagnétiques Avis de l'Anses Rapport d'expertise collective- édition scientifique.

Bellayer, J. 2016. Vivons-nous les prémices d'une catastrophe sanitaire? Book-e-Book, Coll. Une chandelle dans les ténèbres.

Bräscher A.K., K. Raymaekers, O. Van den Bergh, et al. 2017. Are media reports able to cause somatic symptoms attributed to wifi radiation? An experimental test of the negative expectation hypothesis. *Environmental Research* 156: 265–71.

Bremner J.D., P. Randall, T.M. Scott, et al. 1995. MRI-based measurement of hippocampal volume in patients with combat-related posttraumatic stress disorder. *American Journal of Psychiatry* 152(7): 973–981.

Campbell, S., and G. MacQueen. 2004. The role of the hippocampus in the pathophysiology of major depression. *Journal of Psychiatry & Neuroscience* 29(6): 417–426.

Clark, D.M. 1986. A cognitive approach to panic. *Behaviour Research and Therapy* 24(4): 461–470.

Dalgleish T., and F.N. Watts. 1990. Biases of attention and memory in disorders of anxiety and depression. *Clinical Psychology Review* 10: 589–604.

Eltiti, S., D. Wallace, K. Zougkou, et al. 2007. Development and evaluation of the electromagnetic hypersensitivity questionnaire. *Bioelectromagnetics* 28(2): 137–151.

Gallagher, M.W., K.H. Bentley, and D.H. Barlow. 2014. Perceived control and vulnerability to anxiety disorders: A meta-analytic review. *Cognitive Therapy Research* 38(6): 571–584.

Gilbertson, M.W., M.E. Shenton, and A. Ciszewski, et al. 2002. Smaller hippocampal volume predicts pathologic vulnerability to psychological trauma. *Nature Neuroscience* 5(11): 1242–7

Gray, J.A., and N. McNaughton. 2003. *The Neuropsychology of Anxiety: An Enquiry into the Functions of the Septo-Hippocampal System*, Second Edition. Oxford University Press.

Hagström, M., J. Auranen, and R. Ekman. 2013. Electromagnetic hypersensitive Finns: Symptoms, perceived sources and treatments, a questionnaire study. *Pathophysiology* 20(2): 117–122.

Hallberg, O., and G. Oberfeld. 2006. Will we all become electrosensitive? *Electromagnetic Biology and Medicine* 25: 189–191.

ICNIRP. 1998. ICNIRP guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz). *Health Physics* 74(4): 494–522.

Jardine, R., N.G Martin, and A.S. Henderson. 1984. Genetic covariation between neuroticism and the symptoms of anxiety and depression. *Genetics Epidemiology* 1(2): 89–107.

Jones, J.C., and D.H. Barlow. 1992. A new model of posttraumatic stress disorder: Implications for the future. In P.A. Saigh (ed.), *Posttraumatic Stress Disorder*. New York: Macmillan, 147–165.

Kendler, K.S., M.C. Neale, R.C. Kessler, et al. 1992. The genetic epidemiology of phobias in women. The interrelationship of agoraphobia, social phobia, situational phobia, and simple phobia. *Archives of General Psychiatry* 49(4): 273–281.

Ohman, A. 1996. Preferential preattentive processing of threat in anxiety: Preparedness and attentional biases. In R.M. Rapee, *Current Controversies in the Anxiety Disorders*. New York: The Guildford Press, 253–290.

Perrin, A., and M. Souques. 2012. *Electromagnetic Fields, Environment and Health*. Berlin, Germany: Springer.

Rapee, R.M., and R.G. Heimberg. 1997. A cognitive-behavioral model of anxiety in social phobia. *Behaviour Research and Therapy* 35(8): 741–756.

Schröttner, J., and N. Leitgeb. 2008. Sensitivity to electricity—temporal changes in Austria. *BMC Public Health* 8(310).

Szemerszky, R., F. Köteles, R. Lih, et al. 2010. Polluted places or polluted minds? An experimental sham-exposure study on background psychological factors of symptom formation in "idiophatic environmental intolerance attributed to electromagnetic fields." *International Journal of Hygiene and Environmental Health* 213(5): 387–94.

Van Rongen, E., R. Crof, J. Juutilainen, et al. 2009. Effect of radiofrequency electromagnetic fields on the human nervous system. *Journal of Toxicology and Environmental Health* Part B, 12: 572–597.

Witthöft, M., and G.J. Rubin. 2013. Are media warnings about the adverse health effects of modern life self-fulfilling? An experimental study on idiopathic environmental intolerance attributed to electromagnetic fields (IEI-EMF). *Journal of Psychosomatic Research* 74(3): 206–12.

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Religious Belief from Dreams?

Of the several hypotheses about the origins of religious belief, dreams and the content of dreams seem to be highly likely sources of such belief.

DAVID ZEIGLER

"Now if there is one thing about dreams that everyone should know by now, it's that they can seem very real." —John W. Loftus

"Untutored tribes have many good intellectual reasons as to why living people have souls which can leave the body and which possess supernatural powers. First of all is sleep, and dreams." —William Howells

Much speculation and lab work have taken place on the naturalistic origin of life on this planet. Some experiments and observations have suggested pathways toward life, but no actual life form has yet been originated entirely from nonliving material in a modern lab. Even if such a momentous event took place tomorrow, we would still not know that the event duplicated closely the actual origin of life on earth, because there may be more than one possible pathway to life. Similarly, there may be multiple possible pathways to religious belief, and in the case of religion, more than one such path might have contributed to the earliest origins of religion in separate ancestral groups. But just as in the case with the origin of life, we will never be certain which hypotheses on the origin of religion are the correct ones. Our best attempts to answer questions on the origin of religion will always be speculative, though some may garner more substantial evidence and logic than others.

This origin (or origins) of religion took place in our prehistory, often defined as human history prior to the invention of writing, and that indeed is most of our history as a species. Without a written record, we can only surmise as best we can how religious beliefs began. We can look far back into human prehistory for the very earliest signs that might suggest a religious view, but without a written record, there is little empirical information remaining concerning our earliest cultures. We must look at the scant archaeological evidence

of intentional and ceremonial burials with flowers and items of value or utility, of ancient artworks such as cave paintings, carvings, and any other artifacts that would suggest some form of magical and religious belief. In doing so we should remember that the interpretations modern people may make of such meager artifacts may be far off base from what those early and primitive people intended.

We can also look at and compare what is known of primitive religions before they were diluted and modified by contact with "the modern world." Thankfully there is at least some reliable information available on this topic. Still, a problem with this approach is that any cultural invention, such as religion, has almost certainly evolved and diversified rapidly, even before the earliest religions we have actual evidence of and certainly more so since then. Religion is most likely similar to language in being a cultural phenomenon that evolves rapidly. Just compare the Old English of around 800 CE (earliest manuscript of *Beowulf*) with modern English, or even with the Middle English of Chaucer, to see how rapidly and drastically such cultural evolution proceeds. Consider the hundreds of languages that diversified and evolved in the Americas from the original language of the first people to enter the Americas some 15,000 years ago. These peoples have also evolved (culturally) a great many diverse religious myths and beliefs. This tells us that our earliest reliable evidence of religion may not be indicative of the even earlier forms of religious belief. In the face of these facts, the search for the earliest origins of religion seems hopeless, and some researchers have said as much (see, e.g., Evans-Pritchard 1990). Still, religion originated somewhere in those long, lost centuries of our prehistory, and some see value in trying to bend our modern minds to a point where we can conceive and entertain possible models of religious origins. If nothing else, such mental exercises can give us realistic possibilities (and hopefully probabilities) concerning this important subject. Perhaps we can even attempt (at least) an understanding of the minds and thoughts of our distant ancestors.

Without a written record, we can only surmise as best we can how religious beliefs began.

We do have several hypotheses on this matter (Pals 2006), and possibly more will be proposed. One popular idea suggests that when humans became aware that they would die as individuals, it was the fear of death that led to religious belief—or at least to a belief in life after death. A second suggestion is that religious belief fills an adaptive role within a tribe or larger group in that such a shared belief creates a sense of unity, community, and belonging—a role that is undoubtedly true and that still seems obvious for most religious people around the world. This sense of unity or community is essentially ubiquitous in the small communities of early peoples that have been studied, and at least in part this sense does derive from shared religious belief.

While these two hypotheses certainly contain some truth, I do not see how either of these ideas answers the question of the origin of belief in an afterlife, in a spirit world, or in a god. Here I offer my argument for another of the contenders that has, I believe, more explanatory strength as to origins: the idea that dreams were the source of religious beliefs. With my professional background as a biologist, I am obliged to state that my argument is at best that of a curious amateur who may, or may not, be adding any original ideas to this argument. To start with, dreams seem to support a belief in the dualism of mind and body. When we dream, we experience events and places that the body does not, thus it seems there is a separate reality for the mind or spirit. Without a belief in mind/body dualism, it is hard to imagine any reason for religious belief to have ignited.

Reportedly, around 95 percent of people dream, as do many other mammals (Hobson 2002). Certainly then, our earliest ancestors who originated religious beliefs had dreams. Dreaming is a form of consciousness in which a sense of self is generated, yet in dreams we seem to be in places and situations that are not typically those of the body in sleep. What can be made of this strange anomaly? At least some probably concluded that while the body was in one place, the essential self was elsewhere in some mysterious dream world. If so, this was a probable start of our beliefs in mind/body dualism, and thus the beginning of belief in souls or spirits. I have noticed that I often dream about people who are dead, though in my dreams they are of course alive and interacting with me in various places and situations. In most of these cases, the deceased people are members of my family: my father and mother, my brother, some in-laws, aunts, and uncles—in short "ancestors." I have also had a couple of dreams about my deceased major professor—an important mentor in my life. Only the few animals that can recognize and remember individuals in their social groups could possibly dream about other specific individuals in this way. We can only wonder if dolphins, wolves, chimps, and gorillas dream about known individuals, living or dead, in their group. Ants, honeybees, schooling fish, and flocking birds almost certainly do not.

Certainly, our ancestors of prehistory recognized one another as individuals and likely dreamed about those recently dead members of their tribe or group. This experience (along with the idea that spirits of the living could leave their bodies during dreams) could easily have given rise to belief in a spirit world where the dead ancestors lived and where the living could make visits during dreams (Howells 1962). Such a belief would mean that these dead ancestors are still around and still interacting with the living, perhaps trying to communicate with and guide us. In short, *ancestor worship* could easily spring from these assumptions, and ancestor worship is an old and widely spread belief in many of the world's primitive religions (Howells 1962), one I will address again fur-

ther on. Also, believing that recently deceased tribe members are still interacting with the living strengthens the feeling of community, belonging, and importance for the tribe or group. In Africa, dead ancestors are still viewed as members of the village (Johnson 2016).

Two other factors necessary for such beliefs to become established within a group and then get passed on culturally are a "theory of mind" and a sophisticated language. There is some evidence that a few other animals have a theory of mind (recognizing that others have a mind similar to one's own), so this property was likely already present in our earliest ancestors. Sophisticated language came later and is of course uniquely human. Only with language could people share with others these strange experiences of interactions with the dead during dreams, planting and reinforcing these ideas in the minds of others of the tribe and even encouraging them to recognize these themes in their own similar experiences.

When I wake, I recognize that my nightly excursions are only dreams, and being a scientist and rationalist, I view my dreams as curiosities and generally without any special meaning. I certainly don't believe that the dead people who often populate my dreams are trying to communicate with me. Dreams can be thought of as the earliest examples of virtual reality—they can seem very real while they are occurring but obviously are not the real world we come back to upon waking. After decades of sleep and dream studies, there is still today no strong scientific consensus on whether dreams have a function or are rather just cerebral noise generated while the brain is doing other things while asleep (Flanagan 2000). The people of prehistory certainly had no empirical or rational methods to investigate these strange phenomena, though undoubtedly they wondered what dreams were. We know that in many of the more recent civilizations people did seek out the meaning of their dreams from shamans, priests, and astrologers. Even in our modern societies, any sizable bookstore will contain books that claim to reveal what your dreams signify.

The earliest ancestors of our species lived out their entire lives in local and natural environments. For the most part, they did not make great journeys to see new and impressive sights or interact with other really different groups of people except for perhaps a neighboring tribe or two. They largely interacted every day of their lives with family members and others of the tribe who they knew well. Also, their lives were not filled with strange events and changing scenes as are so many modern lives. They had no movies or media through which they could imagine a wider range of experiences, events, and environments. In short, by modern standards their lives and especially their mental lives would have been relatively limited and local.

In some of my dreams, I am in strange environments that I can sometimes realize are places I have visited, or at least close to places I have been—cities, buildings, college campuses, amusement parks, islands, etc. For some reason, I often dream about living in a huge country mansion house like those in the British Isles though I have never been to England and actually visited such homes. Of course, I have seen these and a multitude of other exotic environments on television and in movies and have read about them in books.

Primitive people would not have these multiple sources to draw on for constructing their dreamscapes. They would most likely dream about environments like the ones they experienced on a daily basis, and when they dreamed of dead family or tribe members they would likely be "interacting" in a dream space not unlike the local environment that they experienced throughout their lives. Because of this, upon awakening, I would argue that if they remembered a dream it would not be as bizarre and strange as the average dreams of us folks today. So, the question then arises: What would a primitive person make of dreams in which he and his dead ancestors were interacting and communicating in something like the familiar local landscape, making the dream somewhat realistic? With no scientific understanding of the world and no good intellectual tools to sharply divide reality from the virtual reality he experienced in dreams, one likely interpretation he might make is that these dead ancestors were still somehow present in the landscape or in a realm that somehow overlays the landscape in which he lives. But now the dead can only interact with the living in dreams, and they probably do so because they are still interested in the affairs of the living—of the family and tribe. Such an interpretation leads of course to a belief in life after death and a belief that beings in this "spirit realm" care about us enough to remain in contact with the living. From here, it is a short step to believing that the dead are at times communicating with the living to guide them in the difficulties of life; thus, the dead are to be venerated and obeyed.

Religion originated somewhere in the long, lost centuries of our prehistory, and some see value in trying to bend our modern minds to conceive and entertain possible models of religious origins.

You can recognize in these points some logical first steps toward many of the important tenants of the world's major religions. I would assume that early peoples were prone to the same habit of most modern people—trying to find meaning in the strange and mysterious events of life. For early peoples, I would argue that having an interaction with a known dead person in a dream would qualify as an event that begged for explanation and meaning. It seems reasonable and even obvious that such events could be a source of the belief in spirits and of ancestor worship, ancestor worship being an element in the religions of many primitive cultures from around the

world (Shorter 1984; Howells 1962).

Another potential aspect of dreams that might have contributed to the belief that ancestral spirits or the spirit world can aid the living is the phenomenon of problem solution during dreaming. There is evidence that when we are involved in problematic situations, solutions to these problems sometimes well up during dreaming. This is the origin of the saying that one "should sleep on it" and the answer to the problem may be clearer in the morning. It seems that our brain does work on pertinent problems during sleep. There are many recorded examples of this, such as Elias Howe, who reportedly came upon the key idea for inventing the sewing machine in a dream. Ottow Lowei got the idea for an experiment on the nervous system from a dream, and the results of

I offer my argument for another of the contenders that has more explanatory strength as to origins: the idea that dreams were the source of religious beliefs.

that experiment contributed to his Nobel Prize in 1936. The great Indian mathematician Srinivasa Ramanujan claimed that the Goddess Namakkal came to him in dreams and delivered many of his important insights and ideas. While these (and other) examples seem far removed from early humans, there is at least the possibility that some early humans (who had already concluded that their ancestors lived on in a spirit world) could have had insights of importance arising in their dreams. They surely encountered many problems in their daily struggle for survival. Upon awaking with helpful insights, they might easily credit the dream world spirits for their own ideas—and most likely want to tell others of this amazing occurrence.

I argued earlier that our early ancestors could not have dreams as bizarre as those of modern people because of their limited sources of images and events. They may, however, have been bizarre in a way some experience when dreaming to be another animal. Such dreams are much less common, but they do occur. I once dreamed I was a dog running in my father's yard, and it was indeed both strange and realistic. Many times I have dreamed that I could fly and glide like a bird, and these dreams were very enjoyable and memorable. Dreams such as these may have suggested the idea that all living things may have spirits and that in this realm of the dead one can experience animal spirits—even learning important things from them. Many early religions are animistic in believing that other living things and even mountains, rivers, thunder, etc., have a spiritual essence, and these too of course can appear in dreams.

People of many cultures venerate graves and cemeteries that contain their ancestors. They visit them from time to time, sometimes speaking to their dead ones there. Some religions, including some Christian denominations, hold celebrations in church cemeteries to be near to the departed ancestors of their family, community, tribe, and church. Many of the older believers look forward with anticipation to being eventually reunited with loved ones who have died earlier.

Another possible remnant of ancestor worship is the humanoid characterization of so many of the gods from the earliest records of humanity up to those of today. The several Roman, Greek, and Norse gods serve as decisive examples, as do the major monotheistic gods of today. Many of the older gods were not only portrayed and thought of as human in form but also as having all the major human emotions. In many of the ancient religions, gods even procreated to give rise to other gods and goddesses.

To sum up, it seems very possible that dreams could have contributed much to the earliest glimmerings of religious thought, specifically a belief in spirits and a life after death. I would argue that dreaming of known dead individuals from one's family or tribe is a very likely source of belief in a spirit world, belief in ancestor spirits that interact with the living, and eventually to belief in gods with humanoid traits. Though a much later development, one might recall that the Bible contains several instances of God speaking to or instructing individuals in dreams. In one such example in the book of Matthew, Joseph is instructed in a dream to marry Mary even though she is pregnant because the child is "of God" and therefore no shame should be felt by him or Mary.

While we will never know with certainty how religious belief was ignited in our ancestors of prehistory, it seems apparent that dreams, the mind/body dualism suggested by dreams, and dreams of the dead are all likely candidates for the origins of several aspects of religious belief. Even today, some people believe that spirits or gods communicate with them through dreams. ■

References

Evans-Pritchard, E.E. 1990. *Theories of Primitive Religion*. Oxford: Clarendon Press.

Flanagan, Owen. 2000. *Dreaming Souls*. Oxford: Oxford University Press.

Hinnells, John R. (ed.). 1984. *A Handbook of Living Religions*. New York: Penguin Books Ltd.

Hobson, J. Allen. 2002. *Dreaming: A Very Short Introduction.* Oxford: Oxford University Press.

Howells, W. 1962. *The Heathens*. Salem, WI: Sheffield Publishing Company.

Johnson, Dominic. 2016. *God Is Watching You: How the Fear of God Makes Us Human.* Oxford: Oxford University Press.

Pals, Daniel L. 2006. *Eight Theories of Religion* (2nd Ed). Oxford: Oxford University Press.

Shorter, Aylward. 1984. African religions. In *A Handbook of Living Religions.* John R. Hinnells (ed.). New York: Penguin Books Ltd.

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Creationist Funhouse, Episode Three

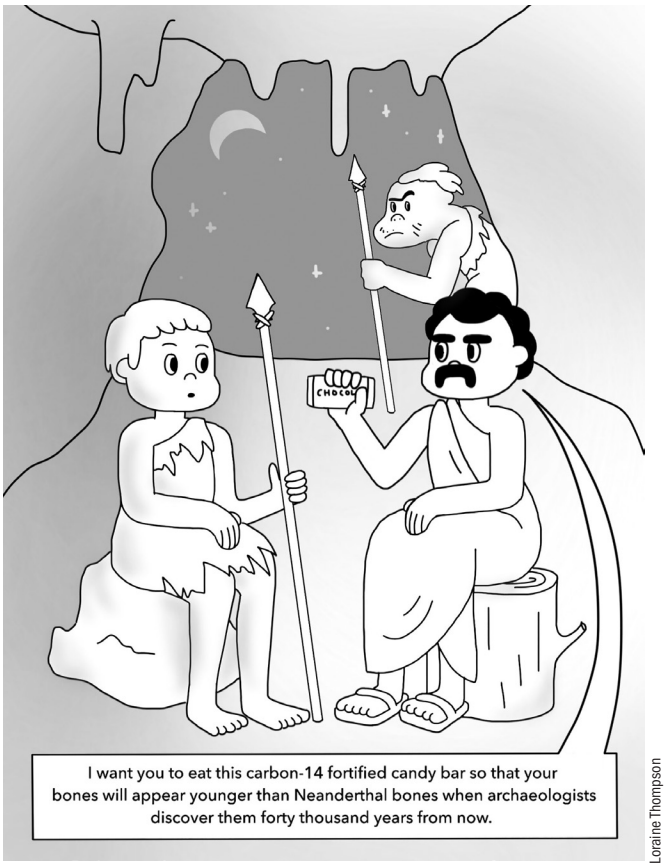
God Plays with Atoms

To reconcile inconvenient scientific findings, the creationists' god had to make sedimentary rock layers nice and smooth and had to tamper with atoms to nullify the results of radiocarbon dating.

STANLEY RICE

This is the third of an occasional series of articles on the Creationist Funhouse.

In the first episode of this series (May/June 2019), I explained that creationists believe that God made a young universe look old. In the second episode (July/August 2019), I explained that creationists believe that God corrupted his own creation. In this installment, we will see how, in their view, God not only made the stars look old but the rocks as well.


I want you to eat this carbon-14 fortified candy bar so that your bones will appear younger than Neanderthal bones when archaeologists discover them forty thousand years from now.

Loraine Thompson

God was very busy during Genesis 1, warping light around to create the Red Shift and during Genesis 3, recreating the whole natural world to curse it. But he really got busy in Genesis 6, during The Flood.

You see, if you thought you could learn about the creation of the earth by studying the rocks, you would be very, very wrong. Genesis 1 tells you nothing about where the rocks came from. To understand that, according to creationists, you must read Genesis 6–8, the story of Noah's Flood. During this time, they say, water covered the entire land surface of the earth for a little over a year. And this water movement would have been so violent, sloshing around in gigantic waves, that it would have torn up all the land masses and produced great mounds of sediment that entombed plants, animals, and people and turned them into fossils. Therefore, according to creationists, the layers of sedimentary rock in the crust of the earth are a record not of what happened in creation but of what happened during the Flood.

The first thing that God had to do to make the young sedimentary rocks appear old was to make the layers of sediments nice and smooth. Sometimes the layers of sediments, which today form rocks such as limestone, shale, and sandstone, form perfectly flat layers for many miles. One look at the Grand Canyon and you can see just how extensive the perfectly flat layers of sediments can be. The Grand Canyon rock layers are quite typical of almost any place in the world you might find sedimentary rocks. Such smooth, flat layers of sediments can form in tranquil, shallow seas; in fact, they are forming this very moment in shallow seas all around the world. But what if there is a gargantuan flood going on all around? God had to make sure the resulting sediments were smooth and flat for hundreds (and sometimes thousands) of successive layers over large areas. The Bible, of course, makes no mention of this. It is the product of creationist fantasy.

But God's job was not this simple. He also had to make

sure that between many of the sedimentary layers there were layers of lava or volcanic ash. That is, he had to hold back the Flood waters from dumping sediments on a sometimes large area, and then call forth a volcanic explosion to pour layers of lava over the fresh sediments or dust them with ash before allowing the Flood waters to resume dumping their sediments. Some volcanic deposits were made underwater—they have a characteristic pillow shape—but most of them formed on the continents. All over the world today, we can see sedimentary rock layers with fossils in them sandwiched between rock layers consisting of volcanic minerals without fossils in them. The Bible makes no mention of God creating volcanic explosions either.

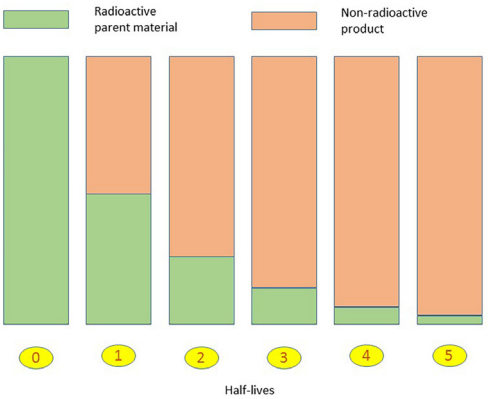
* * *

But perhaps more than anything else, God was very busy during the Flood playing with subatomic particles.

According to creationists, the layers of sedimentary rock in the crust of the earth are a record not of what happened in creation but of what happened during the Flood.

Scientists use radiometric dating to determine the age of certain components of rocks, meaning they use radioactivity as a metric of age. Radioactivity was one of the great discoveries at the turn of the twentieth century. Some large kinds of atoms decompose or fall apart. They eject subatomic particles and turn into different and smaller kinds of atoms in the process. Uranium atoms, for example, undergo radioactive decay to become lead atoms. As a matter of fact, different kinds of uranium atoms decompose into different kinds of lead. You may refer to my Encyclopedia of Evolution, or any number of online websites, for more information.

This radioactive decay is not a random process. Instead it follows the law of half-lives. Over a certain period of time, half of the atoms will decompose. Each kind of radioactive atom has its own half-life. For uranium atoms, a half-life is millions of years. For radioactive carbon, the half-life is 5,730 years.



Radioactive parent material decays into products. Half of the parent material decays each half-life. The comparison of parent material with product allows radiometric estimates of age. With uranium and lead, these estimates are made within crystals that did not contain very much lead when they were formed.

This means that you will never have a time when all the atoms will decompose. After ten half-lives, only one-1,024th of the radioactive atoms remain, but this is still a lot of atoms. For any given atom, you cannot know when it will decompose. The reason that the atoms collectively follow this pattern so strictly takes us right into the realm of quantum mechanics, a realm where

only physicists do not fear to tread.

What happens next seems to be simple. To figure out how old a rock is, just measure the amount of uranium and the amount of lead and calculate how long it would take for uranium to have formed that amount of lead. But as any creationist can tell you—correctly, for once—this is not a valid procedure. What if there were already some lead in the rock before the uranium began decomposing? This would make a young rock appear to be old. Indeed, this would be an invalid procedure—so obviously invalid that, in fact, no geologist uses it. Instead, geologists measure the relative amounts of uranium and lead inside of zircon crystals.

Crystals, as you may intuitively know, get their structures from the atomic characteristics of the minerals that form them. The atoms or molecules have to all line up just the right way. The atoms or molecules inside a crystal, therefore, have to be nearly identical. The wrong kind of atom or molecule would disrupt the crystal structure.

The Bible makes no mention of God creating volcanic explosions either.

Within certain volcanic rocks, zircon crystals form. Within the crystal as it forms, zirconium and uranium atoms (which have a similar external structure) line up. But you do not find very many lead atoms within the crystal, because they do not fit. Therefore, if a scientist finds a zircon crystal in a volcanic rock, he or she can reasonably assume that almost all the lead atoms in the crystal (though not the rest of the rock) came from the radioactive decay of uranium atoms. Zircon crystals formed in volcanic rock under extremely high temperatures, which have been rare on the earth since about 4.5 billion years ago, back when the crust of the earth was still molten. Therefore, most zircons have a lead-to-uranium ratio consistent with that age.

Because newly formed zircon crystals contained little or no lead and creationists believe all zircon crystals are newly formed, one must wonder why any zircon crystals contain any lead at all. How did the lead get there? Creationist websites claim that the lead comes from contamination—the lead atoms diffused into the crystal after it was formed. If in fact the relative amounts of lead and uranium have nothing to do with the passage of billions of years of time, then you would expect random amounts of the two. But this is not what you find. Zircon crystals from geological deposits all over the world appear to be about 4.5 billion years old. Therefore, almost the same amount of contamination must have occurred in all geological deposits all over the world if the creationists are right. And such contamination would have taken a long time to occur, longer than they believe the earth has existed. Perhaps God had to personally supervise the diffusion of lead into the crystals as they formed on a young earth, something not mentioned in the Bible.

* * *

God also apparently played around with radiocarbon atoms. Carbon-14 is a rare form of carbon atom that is unstable. The carbon dioxide in Earth's atmosphere contains a small amount of carbon-14, which plants absorb along with regular carbon in photosynthesis. Any organic material, such as a piece of wood, contains a small amount of carbon-14. Because the half-life of carbon-14 is 5,730 years, the amount of carbon-14 decreases more quickly than uranium. Radiocarbon never all disappears, but after about fifty thousand years, so little of it remains that chemists cannot measure it. Note also that radiocarbon analysis cannot be performed on fossils, in which the original wood and bone molecules have been replaced by minerals and nearly all the original carbon atoms, whether regular or 14, have been lost.

Just as with the zircon dates, the radiocarbon dates are not random. God would have needed to take every organic archaeological specimen and tamper with it. To see an example, come with me in your imagination to the world of cavemen. The Neanderthal cavemen lived in Europe until about 30,000 years ago. Their bone remnants contain small amounts of radiocarbon that are consistent with that age. The Cro-Magnon cavemen, however, lived in Europe more recently, until about 10,000 years ago. Their bone remnants contain, on the average, larger amounts of radiocarbon. These results are not random. No Neanderthal bones younger than about 30,000 years have been found. However, to a creationist, the universe itself did not yet exist even 10,000 years ago. And the caves in which the cavemen lived—whether Neanderthal or Cro-Magnon—are limestone caves, formed of materials that creationists believe were deposited during the Flood just four thousand years ago. Therefore, creationists have to believe that all radiocarbon dates, except very recent ones, are invalid. Why, then, do these dates show a pattern, in which the more primitive specimens have older radiocarbon ages than the more recent specimens? God had to have tampered with them.

* * *

Scientists have only known about radioactivity for a little over a century. Radiometric dating was only recently developed. Anyone living before the twentieth century could not have known anything about God's detailed, worldwide, splendid manipulation of radioactive atoms. As with the Red Shift, God did some of his best work for us, today, to see, rather than for anyone else who lived before us.

But apparently playing around with radioactivity was easy work for God because, as we shall see in the next article in the series, he had time to do some even more creative things with the rock layers. ■

Stanley Rice is professor of biological science at Southeastern Oklahoma State University and the author of five popular science books, most recently *Scientifically Thinking: How to Liberate Your Mind, Solve the World's Problems, and Embrace the Beauty of Science*. He has been dealing constructively with creationism as a college science educator for three decades.

The Climate inside Tom Brady's Pajamas

CRAIG A. FOSTER

President Trump barely attended a U.N. climate summit. Tom Brady and the New England Patriots look ready to win another Super Bowl. It's a good time to talk about the quarterback's pajamas.

Yep, Brady sells pajamas. Well, no, sorry. Brady sells "Athlete Recovery Sleepwear" (ARS). Brady's ARS is advertised with the slogan, "When we wake rested, we rise unbeatable." That is obvious nonsense. I can't imagine any contemporary football expert betting on a rested Miami Dolphins over a groggy New Orleans Saints. Besides, what if both teams are rested? Wouldn't somebody have to lose? Anyway, it's just a tagline, and I digress.

Brady's pajamas apparently enhance recovery because "the mineral-lined fabric returns infrared energy to your body to restore your muscles faster." Brady's ARS is also "POWERED BY REDWAVE." Redwave refers to Redwave Global, a company that offers, among other things, "supercharged" clothing and bedding. Redwave products use a proprietary formula to concentrate the power of "far infrared." These products purportedly help professional athletes with performance and recovery and regular people with sleep and general health.

I don't want to go deep into the electromagnetism inside Tom Brady's pajamas. The Redwave webpage says a lot about being science based but nothing substantial about the physical mechanism that makes Redwave work. Besides, the sports performance industry has many pseudoscientific products in its lineup. I would need to see pretty convincing evidence before I would pay money to get into Brady's mineral-lined pants.

Brady's ARS is compelling because it is so much more than just another performance and recovery product. Brady's ARS is based on a scientific mechanism that could dictate the future of humanity as we know it—a mechanism that would seemingly belie Brady's supposed support for President Trump.

To be fair, I don't know that Brady supports Trump, but some evidence suggests that he does. There was the MAGA hat that found its way into Brady's locker. Trump also claimed that Brady told him that he had voted for him. Take that for what you will. At the same time, Brady's famous wife, Gisele Bündchen, disagreed with speculation on Twitter that she *and* Brady had backed Trump (see www.bostonmagazine.com/arts-entertainment/2016/11/08/gisele-tom-brady-donald-trump/).

I don't envy Brady's position. Political associations such as these force Brady to make a definitive statement about his political play calling or live with speculation—speculation that I am admittedly making. Nonetheless, considering the importance of this issue, I think I can justify the extra point I'm about to kick.

I don't want to go deep into the electromagnetism inside Tom Brady's pajamas.

What do Brady's pajamas have to do with Brady and Trump being possible bedfellows? Brady's ARS operates on the premise that some forms of matter absorb and reemit more infrared radiation than others. If one adds matter that captures and reemits infrared radiation around the human body, the body will receive greater levels of infrared radiation and stay warmer as a result.

You don't say?

That is, of course, the same premise underlying human-caused climate change. Earth emits infrared radiation. When it does, the atmosphere absorbs it and reemits it. Change the atmosphere (by adding more greenhouse gases), and the atmosphere increases the amount of infrared radiation that it reemits back toward Earth. This, in turn, makes Earth warmer.

More to the point, Brady's pajama science sacks Trump's climate change denial.

This does not necessarily make Brady a raging hypocrite. Even if Brady supports Trump, it is possible that Brady disagrees with Trump's no-point stance on Earth's climate. Brady has gently indicated that possibility. It seems odd though. To

those who believe in human-caused climate change, Trump's inaction looks terrifically tragic.

Being a psychology professor, I also understand how somebody could discount global climate change while promoting pajama climate change. The concept of motivated reasoning describes how this can occur. Individuals frequently use different reasoning strategies to arrive at desired conclusions. Accordingly, Brady could find ways to dismiss the importance of atmospheric changes but simultaneously believe in the science behind his ARS.

Brady might believe that he has innovated the infrared-reflecting capabilities of pajama wear while also believing that Earth's atmosphere has not changed meaningfully. Alternatively, Brady might believe that his pajamas trap more infrared radiation than the atmosphere, because his ARS is solid, not gaseous.

I would need to see pretty convincing evidence before I would pay money to get into Brady's mineral-lined pants.

Perhaps Brady believes that human-caused climate change isn't all bad. Brady could read scientific reports about climate change and conclude that people all over the world are reaping recovery and performance benefits from our new and improved atmosphere.

I would love to hear Brady's thoughts on this topic. It looks to me like Brady can either support climate science or discredit his pajama science. Personally, I would like to see Brady use his pajamas to educate the public about human-caused climate change. Brady has so much more influence than I do. His ability to make Earth a safer place could cement his legacy not just as a football player but also as a humanitarian.

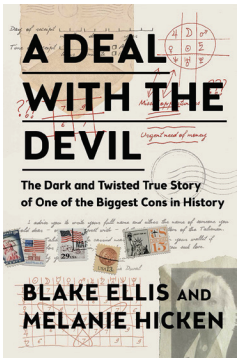
For my part, I would be thrilled to know that I helped Brady tackle global climate change. In fact, I would feel like I won the Super Bowl. ■

Craig A. Foster is a professor of psychology at the U.S. Air Force Academy.

The views expressed in this article are those of the authors and do not necessarily reflect the official policy or position of the United States Air Force Academy, the Air Force, the Department of Defense, or the U.S. Government.

Scamming the Public by Direct Mail

Terence Hines



A Deal with the Devil. Blake Ellis and Melanie Hicken. Atria Books, 2018. ISBN 9-781501-163845-53600. 290 pp. Hardcover, $26.

Most people, when they think of psychic scams, think of the street-corner psychic who takes the casual passerby for a few hundred dollars and who may occasionally score big and take a repeat "customer" for a great deal more over a period of time. The *New York Times* reported such a case on June 6, 2015, when a psychic conned a victim out of over $700,000 to help him in a romantic pursuit. These street-corner psychics tend to be independent operators or part of a local group of con artists. Blake Ellis and Melanie Hicken are experienced investigative reporters for CNN, and their book *A Deal with the Devil* is based on a series of reports of theirs first published on the CNN website in 2016. It describes a psychic scam operation much more organized and international in scope than the usual street-corner scam. It didn't even involve any face-to-face meetings between the psychic and the victims. It was carried out entirely by postal mail.

The book was awarded the Committee for Skeptical Inquiry's annual Robert P. Balles Prize in Critical Thinking (SI, September/October 2019), presented October 18 at the CSICon 2019 conference in Las Vegas. The two authors gave a firsthand video report on their project.

The idea of a mail order paranormal scam is not entirely new. In his August 15, 2015, episode of *Last Week Tonight*, John Oliver did a revealing exposé of prosperity gospel scams that operate largely by direct mail. He sent $20 to televangelist Robert Tilton. In the following several months, Oliver was bombarded with dozens and dozens of direct mail appeals that became more and more demanding and ridiculous as time passed. In one he was asked to trace the outline of his foot on an image of Tilton's foot and mail it back, along with a donation, to receive the supposed benefits of casting his bread upon the waters.

In *A Deal with the Devil*, the authors describe in considerable detail how a similar direct mail scam that focused on psychic advice operated for decades beginning as long ago as the 1980s in countries all over the world. A victim would receive what ap-

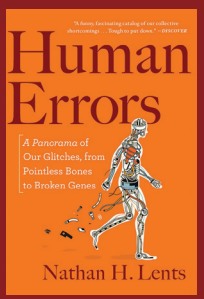
peared to be a handwritten and highly personal letter promising that if a donation was given, the addressee would receive all sorts of benefits, including better health, wealth, and even winning lottery numbers. The letters would go on for page after page and include detailed personal information that helped convince the recipient that the psychic knew all about them. These details included the birth date, birthplace, and marital status of the victim. Once a donation had been made, the scammers knew they had a sucker on the line and, as in the case of the prosperity gospel scam, sent additional letters asking for more money.

As with the prosperity gospel scam, the victims are usually the elderly, the poorly educated, the ill and infirm, and the lonely—the most vulnerable members of society. The book opens with the sad description of a Canadian woman named Doreen who, as her dementia increased, kept sending donation after donation to one direct mail psychic. The authors found such stories all too common.

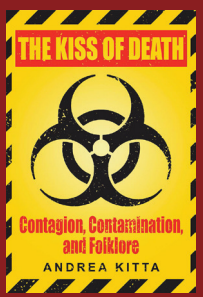
Until I read *A Deal with the Devil*, I'd given no thought to how complex such a scam has to be. Many steps carried out by different companies are required before the letters enter the mail. The first order of business is to get names and addresses of potential victims. These are obtained from the same "data brokers" that supply lists of names and addresses to other, more honest, direct mailers. Data brokers can supply lists broken down by almost any demographic feature one wants, so it's easy to get a list of, say, females over sixty who live in an area with a specified average income level. The personal information in the letters can be obtained from responses the victim made to other solicitations. A common scheme is to send letters offering a chance to win a prize. To enter the contest, the person has to fill out a form that includes a great deal of personal information. That data is combined with the names and addresses supplied by the data brokers and incorporated into the letters the victims receive.

A Deal with the Devil describes a psychic scam operation much more organized and international in scope than the usual street-corner scam.

The solicitation letters have to be written by someone. Not just anyone can dash off letters that will be convincing to the victim. Copywriters are hired to do



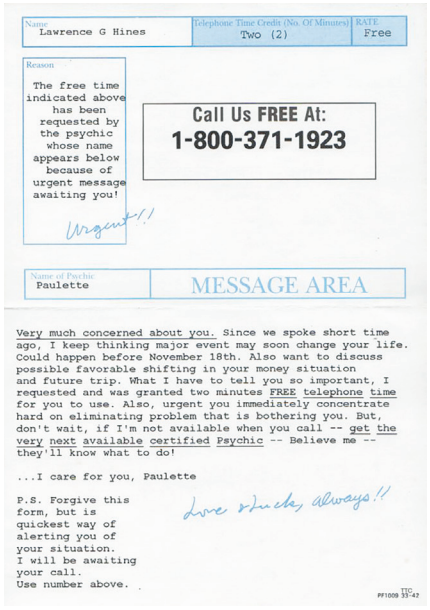
HUMAN ERRORS: A Panorama of Our Glitches, from Pointless Bones to Broken Genes. Nathan H. Lents. A biology professor's fascinating run through some of the many "mistakes" and glitches in how our bodies are put together, a consequence of evolution working not via some grand design but having to work with what was available. If you've ever wondered why you share a breathing tube with an eating tube, why you get sinus infections, or why we have such poor vision compared with many animals, you should enjoy this book. Beginning with his introduction, "Behold, the Blunders of Nature," Lents finds it all amusing and interesting, and he shares that enthusiasm with the reader. The book is also instructive, as it gives one better understanding of how evolution does, and doesn't, work. Perfection has no role. Mariner Books, 2019, 233 pp., $15.99.



THE KISS OF DEATH: Contagion, Contamination, and Folklore. Andrea Kitta. For many laypeople, the term *folklore* evokes topics such as urban legends and fairy tales, but the discipline is far broader. In *The Kiss of Death*, folklorist Andrea Kitta (Department of English at East Carolina University) examines folklore surrounding medicine, disease, and health. Over the course of seven chapters, Kitta treats disease not merely as a medical issue but also as a social one. Topics include immigration fears, Slenderman, zombies, and much more. Legends and rumors about disease are common and can have real-world consequences, ranging from anti-vaccine misinformation to conspiracy theories about AIDS, Ebola, and other public health concerns. As Kitta notes, "Even when individuals tell narratives [that] are not believed or are treated as 'just stories,' they can still negatively affect decision-making processes. This, in turn, could be detrimental to the health of both individuals and communities." Stories of contagion often blend seamlessly into lessons in xenophobia, delineating "us versus them," the wholesome versus the unclean. Skeptical activism often involves calming (or trying to calm) the public's concerns about exaggerated threats, from EMF-emitting cell phones to Satanic cults, and *The Kiss of Death* has important lessons for the intersection between skepticism and folklore. Some of the writing is necessarily academic, but the book is accessible to the general reader. Utah State University Press, 2019, 200 pp., $21.95.

THE LOST PLANETS: Peter Van de Kamp and the Vanishing Planets around Barnard's Star. John Wenz. Foreword by Corey S. Powell. We may have become almost jaded by the discoveries of 3,000-plus exoplanets—planets outside our solar system—by the Kepler spacecraft and other observatories in the past decade or two. But back in the 1960s, astronomer Peter Van de Kamp of Swarthmore Observatory thought he had discovered evidence of a planet around Barnard's Star, from the star's "wobbles" as if a planet was orbiting it. If confirmed (though most astronomers were fairly skeptical from the beginning), this would have been the earliest discovery of an exoplanet. Wenz provides a useful short history of why the astronomer thought he had obtained the first evidence of an exoplanet, how and why the claim was eventually found to fall short, and how Van de Kamp was stubborn in his refusal to accept that he was wrong. An interesting and useful case study in ultimately mistaken science. MIT Press, 2019, 200 pp., $24.95.

this. These copywriters clearly know that they're involved in a highly dishonest enterprise. The authors interviewed one such copywriter. It was a high paying job. He could charge up to $20,000 for an effective letter, and he "received many requests to write these kinds of letters as the mail-order psychic business boomed in the nineties"


Name
Lawrence G Hines

Telephone Time Credit (No. Of Minutes)
Two (2)

RATE
Free

Reason
The free time indicated above has been requested by the psychic whose name appears below because of urgent message awaiting you!

Urgent!!

Call Us FREE At:
1-800-371-1923

Name of Psychic
Paulette

MESSAGE AREA

Very much concerned about you. Since we spoke short time ago, I keep thinking major event may soon change your life. Could happen before November 18th. Also want to discuss possible favorable shifting in your money situation and future trip. What I have to tell you so important, I requested and was granted two minutes FREE telephone time for you to use. Also, urgent you immediately concentrate hard on eliminating problem that is bothering you. But, don't wait, if I'm not available when you call -- get the very next available certified Psychic -- Believe me -- they'll know what to do!

...I care for you, Paulette

P.S. Forgive this form, but is quickest way of alerting you of your situation. I will be awaiting your call. Use number above.

Love & luck, always!!

TTC
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(130). This gives an idea of the amount of money such scams generate. A successful letter generated a response rate of around 10 percent, while the figure for a "dud" was about 4 percent. Some copywriters charged a flat fee for their work while others worked on a royalty basis—around 10 percent of the money their letter brought in. The interviewed copywriter tried to justify his involvement by attempting to minimize the harm done. He claimed that his letters brought some benefits to the targets, for example by making them feel better because they found out that someone really cared about them.

After the letters were written, they had to be printed. Millions were printed, so this required large commercial printing companies. Then the letters had to be entered into the mail stream. You can't just drop off a bundle of a hundred thousand letters at the local post office, so commercial direct mail companies handled this task. The letters often included various nick-knacks such as "round metal talismans encased in little velveteen pouches with symbols and some motivational words or astrological signs on them" (26). These were described in the letters as valuable treasures with potential mystical powers. Because millions of these were sent out, they had to be mass produced by firms that manufacture such things.

The letters asked for donations as well as personal items, such as locks of hair. This is an example of a well-known psychological phenomenon called the "foot-in-the-door-effect" wherein if you ask a person to do a small favor and they do so, they will be more likely to do a larger favor when asked. When the victim takes the time and effort, albeit minimal, to cut and send a lock of hair, they have complied with the first request for a favor. With millions of letters going out, hundreds of thousands of responses came in. The victims were instructed to send their responses to addresses that were mailboxes at private mailing stores. One such address was in Sparks, Nevada. These letters often included heart-rending stories of personal tragedy along with the donations. From the original address, the envelopes were bundled and sent on to, in one case, an address on Long Island in New York. It was there that postal inspectors, who were trying to put an end to one particular direct mail psychic scam, found thousands of letters, complete with locks of hair and the aforementioned tales of personal tragedy, tossed in a dumpster. Of course, the "psychic" was never going to personally answer these letters, but further requests for donations would follow.

Once the money, cash, or checks had been received, it had to be deposited into bank accounts. In the particular scam described in *A Deal with the Devil*, one of the companies processing the funds was the Canadian company PacNet Services of Vancouver, British Columbia. This was a firm that "had profited from all kinds of global mail fraud for years" (225). PacNet took its cut and forwarded the remaining money to the different scammers.

An example of a mailing card from a psychic scam, although not the one discussed in the book, is shown at left. The meter imprint is faded but reads "Sun Valley, CA" and is dated November 1, 1996. The card advises the addressee that a psychic named Paulette is "Very much concerned about you. Since we spoke a short time ago, I keep thinking major event may soon change your life." The card is addressed to my father, who died in late 1990.

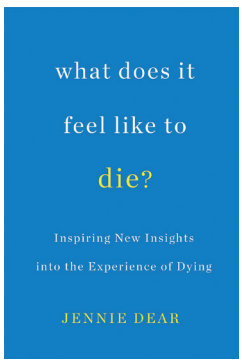
A Deal with the Devil is really a detective story in which the authors try to track down a psychic named Maria Duval, who may be a real person or just a name made up for the scam. In either case, she was the name behind a direct mail psychic scam that lasted for decades and included the United States and Canada as well as numerous other countries. You'll have to read the book to find out whether Maria Duval was a real person or not. *A Deal with the Devil* is a fascinating and disturbing exposé of the slick and highly lucrative business of mail order psychics. The leaders of this industry drive expensive cars and hold business conferences in expensive hotels in fancy resort locations around the world such as Monaco.

Excellent as the book is, it has two shortcomings. First, there is no index, making it difficult to look up specific names and topics that recur throughout the text. More serious is the lack of any introductory discussion of the various tricks of the psychic trade, such as cold readings, the Barnum Effect, and selective memory. A brief section covering these techniques would have greatly helped readers not familiar with them understand how psychics, by direct mail or in person, con people into believing they have real paranormal powers.■

Terence Hines is professor of psychology at Pace University and author of *Pseudoscience and the Paranormal*. He is a CSI fellow.

What Does It Feel Like to Die?

HARRIET HALL

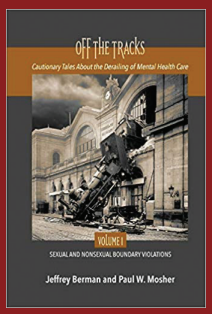


What Does It Feel Like to Die? Inspiring New Insights from the Experience of Dying. Jennie Dear. Citadel Press/Kensington Publishing. 2019. ISBN 978-0-8065-3986-7. 206 pp. Softcover, $14.99.

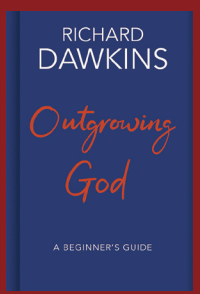
We're all going to die. What does dying feel like? We can't really know, because no one has come back after death to tell us. For those who die suddenly (for instance from a fatal gunshot to the head), there probably isn't time to feel anything. But 90 percent of people die slowly from a fatal disease. What can we expect to happen during the days, months, or even years between diagnosis and departure? In her book *What Does It Feel Like to Die? Inspiring New Insights into the Experience of Dying*, Jennie Dear reports on recent research and observations about that period and peppers her reporting with anecdotes from her experiences as a hospice volunteer and as a caregiver for her dying mother. Understanding this information can help us prepare for our own death and can suggest coping strategies.

Witnesses tend to ascribe a lower quality of life for dying people, but studies have shown that the patients themselves rate their quality of life the same as healthy people.

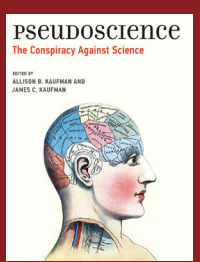
Depictions of death on TV and in the movies are unrealistic; the characters are awake and carry on meaningful conversations, then suddenly close their eyes and die. That's not how it works. In the days when deaths occurred at home, most people had seen a relative die. Today we have a lot of knowledge about what happens in the body


OFF THE TRACKS
Cautionary Tales About the Derailing of Mental Health Care
VOLUME 2
SEXUAL AND NONSEXUAL BOUNDARY VIOLATIONS
Jeffrey Berman and Paul W. Mosher

OFF THE TRACKS: Cautionary Tales about the Derailing of Mental Health Care, Volume 2. Paul. W. Mosher and Jeffrey Berman. In this massive two-volume work (volume one deals with sexual and nonsexual boundary violations), the authors (a clinical professor of psychiatry at Albany Medical College and a professor of English at University of Albany) present dramatic examples where the psychological treatment relationship was mismanaged in such a way as to harm mentally ill patients. This second volume deals with many subjects long of interest to skeptics: L. Ron Hubbard and Scientology (plus a second chapter about a female patient who died while undergoing Scientology treatment), John E. Mack and the alien abduction craze, and the battles over supposed Satanic ritual abuse and false memories. The books have been called "stimulating and thought provoking"; "brave and intriguing"; and "a chilling read ... We are all vulnerable to deception." IPBooks (International Psychoanalytic Books), 2019, 537 pp., $39.95.



OUTGROWING GOD: A Beginner's Guide. Richard Dawkins. Originally envisioned by Dawkins as a version of his best-seller *The God Delusion* written for young people, this easy-to-read new work stands on its own for all ages. It is divided into two sections: "Goodbye God" and "Evolution and Beyond." The first includes chapters on "So many gods!," "But is it true?," "Myths and how they start," and "Do we need a god in order to be good?" The second includes many topics of interest to skeptics and science-minded people: "Surely there must be a designer?," "Steps toward improbability," "Crystals and jigsaw puzzles," "Did we evolve to be religious? Nice?," and perhaps the most interesting, the final chapter, "Taking courage from science," a selection of examples of amazing scientific insights that are contrary to common sense but nevertheless strongly supported by evidence. It requires courage to cast aside our preconceptions and accept the evidence, and that is Dawkins's central message. Random House, 2019, 295 pp., $27.



PSEUDOSCIENCE: The Conspiracy against Science. Edited by Allison B. Kaufman and James C. Kaufman. A valuable academic work examining all aspects of pseudoscience, something the editors point out we are particularly susceptible to in this post-truth, fact-challenged world. Thirty-five contributors, most academic scholars, many of them familiar to SI readers, examine this topic in four sections: Part 1, The Basics of Pseudoscience; Part II, What Pseudoscience Costs Society; Part III, Scientific (or Pseudoscientific) Soundness; and Part IV, Pseudoscience in the Mainstream. With a foreword by Scott O. Lillienfeld about ten enduring lessons from the study of pseudoscience, starting with "We are all biased" and ending with "skepticism differs from cynicism." Reviewed in our November/December 2019 issue. MIT Press, 2019, 510 pp., $34.95.

—Kendrick Frazier and Benjamin Radford

as it begins shutting down. It's a gradual process.

Most people accept the idea of their own death intellectually but not emotionally. They don't really believe they are going to die until they get that existential slap and realize that their disease is really going to kill them. After that realization, they may experience depression, anxiety, despair, anger, and a loss of identity and meaning. This phase tends to last an average of three months. When the initial distress subsides, expectations change, and patients find ways to cope. They may even find a new meaning in life and a richer sense of who they are.

Patients are not so much afraid of dying as afraid of pain, losing control, and becoming dependent on others.

Dear describes four possible trajectories:

1. Relatively good health followed by a quick death;
2. Gradual deterioration culminating in death;
3. A fluctuating course of complications and improvements;
4. Years of progressive frailty until the body is unable to recover from the stress of an infection or a broken bone.

Scenario 4 is the most likely. Modern medicine keeps us alive and allows us to remain sicker longer. Witnesses tend to ascribe a lower quality of life for dying people, but studies have shown that the patients themselves rate their quality of life the same as healthy people, or sometimes even better.

We all have to die of something, and preventing one cause of death only increases the incidence of deaths from other causes. In this regard, Dear points out that seatbelts could be considered carcinogenic.

Elizabeth Kübler-Ross's five stages of grief in terminal illness are denial, anger, bargaining, depression, and acceptance. They have not been validated by peer-reviewed research and are frequently misunderstood. They don't apply to everyone, and they don't happen in any particular order.

Patients are not so much afraid of dying as afraid of pain, losing control, and becoming dependent on others. One of the attractions of alternative medicine is that it can give the illusion of control. And it can offer an illusion of certainty where conventional medicine is uncertain. Eighty percent of prognoses about how long a patient will live are wrong, and phrases such as "The doctor said I had six months to live" can be misunderstood. Doctors can't predict the future; at best, they can only offer a guess based on the average historical life expectancy of more-or-less comparable patients.

Eighty percent of Americans say they want to die at home, but only 30 percent actually do. They may not get to choose, or they may change their mind when home care proves unrealistic or problematic for various reasons. More and more patients are dying in hospice, where they get palliative care with no intent to prolong life. Forty percent of hospice patients use the service for two weeks or less.

Pain can almost always be controlled, but there is a trade-off with side effects such as sleepiness. Sometimes the only way to completely relieve pain is palliative sedation, keeping the patient unconscious. Pain is not the same as suffering; the same physical pain will cause less suffering if the patient believes it is temporary. Psychological interventions are being tested to help people cope better with dying. They can help patients reassess their priorities, find meaning in their lives, develop positive attitudes, resolve unfinished business and personal conflicts, and express the things they want to say to loved ones. Impending death can be reframed as a normal life stage, a second chance to correct past errors, and an opportunity for post-traumatic growth.

Dear discusses why some people want to hasten their death and describes both legal and illegal ways to do it. She discusses phenomena such as hallucinations, delirium, insights from near-death experiences (NDEs), terminal agitation, plucking, visions, the death rattle, and terminal lucidity, where an unconscious patient becomes awake, lucid, and coherent right before dying. As the body systems shut down, people lose interest in the outside world. They lose hunger, then thirst, then speech and vision. Hearing and touch are the last to go. They may enter into a dreamlike state. Death itself is usually painless and peaceful.

She presents facts supported by references to scientific studies and illustrated by anecdotes. Most of what she says is not controversial, but not everyone would agree with her characterization of "active dying." One of the instructors in my residency program had been assigned to manage a ward of terminal patients during his training. He told the patients they were not dying, they were living (and would continue to be living until they actually died). He tried to create a pleasant living environment in the ward, and he let patients out on passes to go do the things they loved to do, such as fishing. His superiors got very upset because their patients were out dying all over the county instead of in their hospital beds. He thought that was a *good* thing, and I do too.

This little (206-page) book contains a wealth of information and food for thought. Unless you have somehow discovered the secret of immortality, I think you would benefit from reading it. I know I did. I feel better informed and better equipped to face my own death and the deaths of my loved ones. ■

Harriet Hall, MD, also known as "The SkepDoc," is a retired family physician and SI contributing editor and columnist.

The Health Wars

First, let me say the happiest day every two months is when my new issue of Skeptical Inquirer arrives, and the saddest day is the day I finish reading it (which sometimes occurs the same day). I admit when I first saw the subject of your "Health Wars" issue (September/October 2019), I did not expect to find it as thoroughly interesting and informative as I did. I suppose I have heard of all these claims at one time or another, but having them all gathered in one place was very compelling.

I found Victor Benson's piece on the National Geographic Society's books to be especially good.

While I recognize that there are too many claims out there to investigate all of them in a single issue, I was disappointed at the absence of a review of the claims for apple cider vinegar, which is claimed to cure everything from A to Z. I hope a future issue might explore the actual benefits of this miracle product (personally, I find it useful in salad dressing).

Thank you very much, and I eagerly await the next issue.

Katherine Rogers
North Potomac, Maryland

I just finished reading your September/October 2019 issue regarding medicines good, bad, and indifferent. It reminded me of my childhood and teens in the 1940s–1950s. I would visit my Dad, A.P. Warthman, a well-respected physician in Detroit, and observe some of his interactions with patients. He had a large jar of pink "pills" on his shelf, and whenever a patient would complain of one thing or another and there was no evident problem, he would offer a packet of those pink pills. "Take these and see if it makes you feel better," he would say. In most cases the patients felt a lot better and always asked for more of the pills when they visited. When there were no patients around, I would be allowed to take a couple, as they were all just pink candy.

Edythe Robinson
Starke, Florida

I do not know if most people are aware, but back in 2015 the National Geographic Society sold its media properties and publications to National Geographic Partners LLC—majority owned by 21st Century Fox—controlled by Rupert Murdoch (a climate change denier, among other things). Earlier this year Disney took over stewardship of National Geographic Partners when it acquired 21st Century Fox. To me, this indicates that possibly we should be very careful when we now see books and magazines from National Geographic. It used to be that you could trust the information presented—but maybe not anymore.

Kathy Petersen
Granite Bay, California

No one should be surprised by the decline of standards of National Geographic after it was purchased by the ethically challenged Rupert Murdoch. The magazine, along with Fox News and *The Wall Street Journal*, have been part of the Murdoch empire for quite some time now. How ironic that in the era of MAGA, Fox News, America's most watched news outlet; *The Wall Street Journal*, America's most important business newspaper; and the National Geographic are foreign owned!

James Williams
Kent, Ohio

Editor's note: As of March 20, 2019, National Geographic Partners is now owned by the Walt Disney Company; see our News and Comment "Wither National Geographic?" in this issue.

I have no confidence in SCAM [so-called alternative medicine], for the reasons cited in your excellent issue. But I am a skeptic even of skeptics.

Consider: Like SCAM, conventional medications often do not work. Or they work via often poorly understood mechanisms (as one can learn from reading the fine print in the literature pamphlet that comes with a prescription). Or people get better with little or no certainty that the medication helped—maybe the ailment was going into remission anyway, or there was a placebo effect. Prescription drugs can be harmful (just listen to the long lists of side effects in the TV ads), even lethal. They have caused birth defects. But it is hard to imagine a class of medications more dangerous than legal psychotropic drugs, which are prescribed to children, although the meds can have a dozen side effects and, while purporting to cure depression, can sometimes cause suicidal thoughts. Many drugs, even if approved, are later deemed so unsafe that they must be recalled. Clinical studies can be biased or flawed, the data faked or fudged, the study impossible to replicate. "Science-based" is a bar that is sometimes not reached.

I invite a reply from one of your medical specialists. Yes, SCAM postulates a lot of imaginary entities. But other than that, how are the two classes of therapies truly different?

Alan M. Perlman
Rindge, New Hampshire

Harriet Hall, MD, responds to Perlman's letter:

Good skeptics are skeptical about everything, including other skeptics. Science-based medicine is skeptical about everything and has frequently revisited long-established treatments, found new evidence that they weren't really effective, and has stopped using them. Your example of drug recalls is a prime example of real medicine responding to new and better evidence.

If a medication has been shown to work, we don't necessarily need to know "how" it works; we used aspirin for decades before we began to understand its mechanism of action. Conventional medications have to prove efficacy and safety to the FDA before they can be approved for marketing. That doesn't mean they always work reliably for every individual. We can never be sure a given medication was what cured an individual patient; that's why we have to do controlled clinical studies to compensate for confounders such as remissions and placebo effects. Studies can only show a medication is more effective than a placebo for the population studied; they can't predict how each individual will respond.

All medications that have effects will also have side effects. Treatment decisions must balance the risks against the benefits. Science-based medicine is well aware of the many factors that may invalidate the results of clinical studies. Science is an ongoing, self-correcting collective effort that eventually sorts out the truth. It isn't perfect, but it's a heck of a lot better than SCAM. SCAM is all too willing to accept flawed evidence, and it places undue emphasis on unreliable personal experience and anecdote. Unlike conventional medicine, SCAM has no culture of self-criticism and never stops using a treatment. Case in point: homeopathy was debunked well over a century ago but is still thriving. Conventional medicine can boast of many triumphs. It has changed HIV/AIDS from a death sentence to a controllable chronic disease that doesn't even shorten life expectancy. It has already developed an effective vaccine against Ebola. What has SCAM ever accomplished? There can be no comparison.

Opioids: Good, Bad, Ugly

Regarding the informative article "Opioids: The Good, the Bad, and the Ugly" by Dr. Harriet Hall (September/October 2019), I want to disagree with one assertion, "We are in the midst of an opioid epidemic" propelled at least partly by opioid prescription abuse.

Yes, we physicians, urged on

by "Big Pharma," did for too many years over-prescribe. But our profession is doing better. Between 2012 and 2017, the U.S. medical opioid prescription rate per 100 patients dropped from sixty to forty per person. (Opioid painkiller prescriptions in Britain also started to decline in 2016.) Despite the shift to more lethal fentanyl agents noted by Dr. Hall, U.S. opioid drug overdose deaths dropped from 72,000 to 68,500 between 2017 and 2018 (U.S. Centers Disease Control and Prevention, 2019, Statistics, opioid overdose, Data Overview).

These data suggest we are closer to the end than to the "middle" of the lethal opioid misuse epidemic.

Peter Barglow, MD
Berkeley, California

Dr. Barglow wrote "Confessions of an American Opium Prescriber" in our July/August 2019 issue.—Editor

Magic Waters?

I liked Joe Nickell's "Magic Waters" article (September/October 2019), but some magic seems to have made its way into his geography. The River Jordan is completely landlocked, flowing southward through the Jordan Valley and terminating in the Dead Sea.

John Gee
Singapore
Republic of Singapore

I'm sure many readers will point this out, but the Jordan River does not connect the Dead Sea to the Mediterranean except possibly by rainwater condensed from clouds formed over the Mediterranean that move east. The River Jordan flows into the Dead Sea, from which nothing escapes except mineral salts from evaporation ponds that are mined commercially and evaporation of the lake itself. There was some speculation that water could be added to the Dead Sea to keep it from actually dying, but this was from a canal or aqueduct from the Red Sea—not the Mediterranean.

Frank Archer
Delta, B.C., Canada

Gloucester Serpent

Regarding Joe Nickell's analysis of the 1817 Gloucester Sea-Serpent Mystery (September/October 2019), I believe he missed an interesting point regarding the strange southern range of the narwhals. The previous year, 1816, was also known as the year without a summer because of the unusually cold weather caused by volcanic dust in 1815. I wonder if an oceanographer could confirm whether (or weather!) changes in ocean temperature could be offset by a year at least, explaining the range of these animals usually found in colder waters.

Joseph Gagné
Historian
Québec City, Canada

Although I enjoyed reading Joe Nickell's article about solving the Gloucester sea-serpent mystery, two significant pieces of information were not addressed.

First, there was a new book about this same subject featured in the "New and Notable" section of this very issue of Skeptical Inquirer, titled *Disentangled.* This book concludes that the animal was most likely "a marine animal that was entangled in fishing gear and other marine debris." Nickell did not address this book or the reasons a new book on this subject reached such a different conclusion.

Second, there is the unusual situation of the "Sea Serpent" being sighted several times in 1817 and 1819 and then never seen again. In this case, I believe that I have an explanation that bolsters Nickell's case that the "Sea Serpent" was a group of narwhals. As Nickell notes, narwhals are normally found above the Arctic Circle. However, 1817 and 1819 were not usual times. If you Google "year without a summer," you will find that not only was this time period right at the end of the little ice age, but it occurred right after the immense volcanic explosion of 1815 at Mount Tambora in Indonesia that led to "the year without a summer" in 1816.

From the point of view of a narwhal, from 1816 to 1819, the Arctic Circle moved south to Gloucester. Then, after the sulfates dispersed, the Arctic Circle returned to its usual location, again, from the point of view of a narwhal. This unusual happenstance would explain why the narwhals would suddenly appear in an area that is far south of their usual habitat and, also, why they never came back.

Ben Fishler
Dennis, Massachusetts

Anomaly Hunting by Satellite

In his column "Anomaly Hunting with Satellite Images" (July/August 2019), Benjamin Radford responds to V. Corbett on a couple of unusual Google Earth images Corbett submitted for comment.

The images in question look to me like typical overlaps of satellite images taken on different passes over a region in question. The algorithm for overlaying images is imperfect, and we frequently see artifacts such as those depicted in the ocean views. Oceans do not have distinct spatial features that support careful overlapping of images, so portions of the Google Earth views often show difference of illumination or imprecise colorations. There may also be imprecision in spatial filtering to remove background noise from atmospheric scintillation.

Bernard Roth
Santa Barbara, California

Were Mars's Canyons Visible?

I appreciate the comments by Klaus Brasch in his response to my letter "Those Martians Canals Again" (Letters, May/June 2019), as well as bringing to my attention the two sources *A Traveler's Guide to Mars* by William K. Hartmann (Workman Publishing, 2003) and *Mars: The Photographic Story* by Earl C. Slipher (Lowell Observatory, 1962).

Klaus Brasch is correct when conveying the quotation from Hartmann's book that "Proof that some of Schiaparelli's and Lowell's much-criticized canals were based on real features can be found in a Martian region known as Xanthe." However, this quote does not necessarily contradict the statement that the canals reported by Percival Lowell and the martian canyon-like structures should be considered as serendipitous. In fact, the size of the canyon system at the Xanthe region is very small compared to Valles Marineris. Therefore, if the latter would be "borderline observable" via ground-based observations, the Xanthe canyons surely would not be. In fact, a careful read of Hartmann's book indicates that he also attributes the discovery of Valles Marineris to the Mariner 9 mission. On pages 24–25, Hartmann summarizes the various findings of that mission, including lava-covered plains, volcanoes, craters, and—yes—Valles Marineris. (William Hartmann also was the first winner of the Carl Sagan Medal from the American Astronomical Society, awarded in 1998.)

The book by Earl Slipher contains a large collection of photos with many of them of unprecedented historical value. Unfortunately, it also contains various scientific statements that from today's perspective are not correct. Examples include his statements about the absence of tall mountains on Mars, surface water (though described as minor), and martian vegetation (pages 66, 68, 69). In that context, he also comments on vegetational seasonal variations as well as suspected metabolisms. Regarding the photos, he makes no explicit statement that Valles Marineris has previously been detected through ground-based observations. But some of the photos are suggestive. For example, the three panels of Plate V (see p. 79) show an extended dark equatorial region; beneath the panels, the map by Lowell (1905) with the martian "canals" is shown, including annotations. The dark region depicted in Plate V globally follows Mars's equator. However, based on the picture, that

feature can be estimated as more than 1,000 km wide, a value that is more than a factor ten greater than the width of Valles Marineris. The structure could thus be associated with a martian sandstorm.

In conclusion, the statement that Valles Marineris was discovered by Mariner 9 remains valid. The problem with ground-based observations is atmospheric seeing. The apparent size of Valles Marineris can be estimated as about ten arcseconds long and one to two arcseconds wide, as visible from Earth under ideal conditions with Mars in opposition, an estimate also confirmed by Dr. Michael Endl (senior research scientist, McDonald Observatory, University of Texas System; private communication). Seeing under extremely superb conditions as, e.g., obtainable at high-altitude observatories such as on Mauna Kea (Hawaii) can deliver better results. However, facilities of that caliber were unavailable at Schiaparelli's and Lowell's times. Moreover, even if ground-based observations under best conditions based upon up-to-date technology were giving hints of structures akin to Valles Marineris, those findings would not rival the unequivocalness of observations delivered by Mariner 9 in 1972 and subsequent missions.

Manfred Cuntz
Department
of Physics
University of Texas
at Arlington

[FEEDBACK

The letters column is a forum on matters raised in previous issues. **Letters should be no longer than 225 words**. Due to the volume of letters we receive, not all can be published. Send letters as email text (not attachments) to letters@skepticalinquirer.org. In the subject line, provide your surname and informative identification, e.g.: "Smith Letter on Jones evolution article." Include your name and address at the end of the letter. You may also mail your letter to the editor to 944 Deer Dr. NE, Albuquerque, NM 87122.

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